

EXHIBIT 1



US005817207A

United States Patent [19]

Leighton

[11] **Patent Number:** **5,817,207**[45] **Date of Patent:** **Oct. 6, 1998**

[54] **RADIO FREQUENCY IDENTIFICATION CARD AND HOT LAMINATION PROCESS FOR THE MANUFACTURE OF RADIO FREQUENCY IDENTIFICATION CARDS**

[76] Inventor: **Keith R. Leighton**, 2817 Fulmer Rd., Lorain, Ohio 44053

[21] Appl. No.: **727,789**

[22] Filed: **Oct. 7, 1996**

Related U.S. Application Data

[60] Provisional application No. 60/005,685 Oct. 17, 1995.

[51] **Int. Cl.⁶** **B32B 31/20**

[52] **U.S. Cl.** **156/298; 156/312**

[58] **Field of Search** 156/300, 312, 156/311, 298

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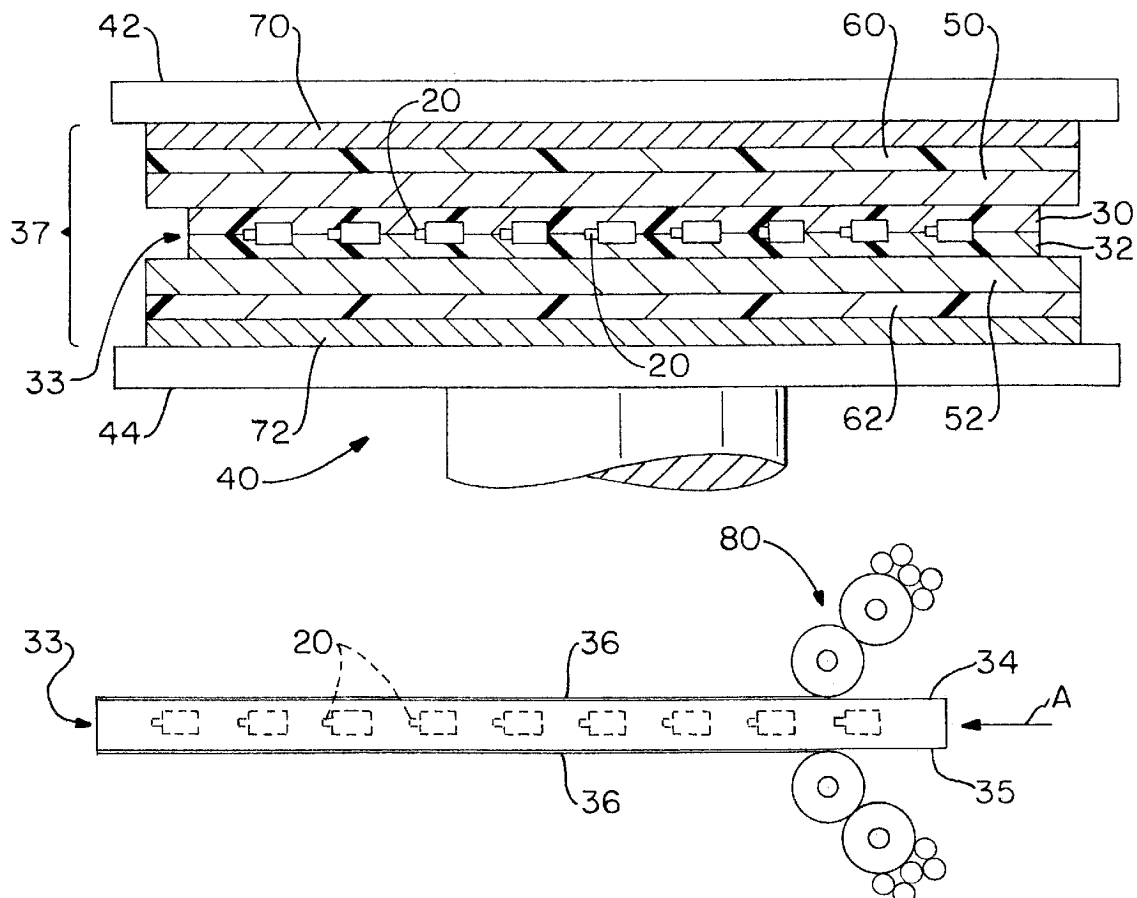
Primary Examiner—Francis J. Lorin

Attorney, Agent, or Firm—Oldham & Oldham Co., L.P.A.

[57] ABSTRACT

A plastic card, such as a radio frequency identification card, including at least one electronic element embedded therein and a hot lamination process for the manufacture of radio frequency identification cards and other plastic cards including a micro-chip embedded therein. The process results in a card having an overall thickness in the range of 0.028 inches to 0.032 inches with a surface suitable for receiving dye sublimation printing—the variation in card thickness across the surface is less than 0.0005 inches. A card manufactured in accordance with the present invention also complies with all industry standards and specifications. Also, the hot lamination process of the present invention results in an aesthetically pleasing card. The invention also relates to a plastic card formed in accordance with the hot lamination process of the present invention.

17 Claims, 3 Drawing Sheets



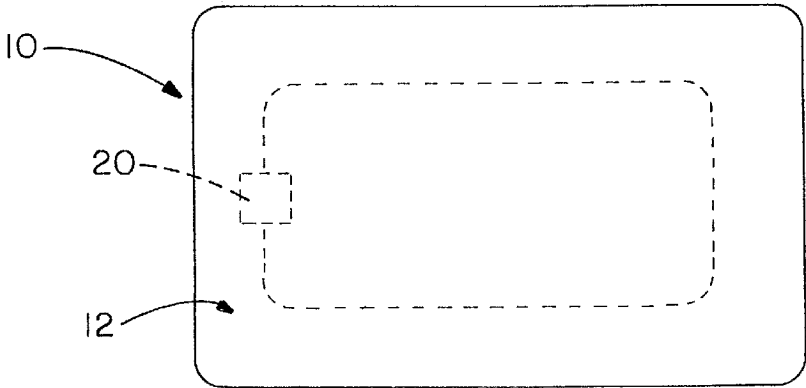


FIG. - 1

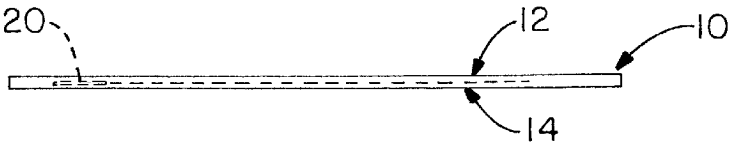


FIG. - 2

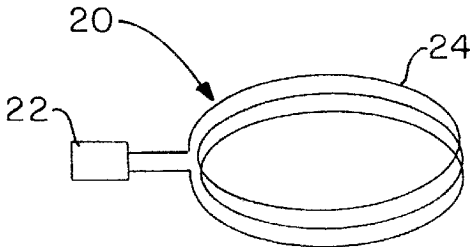


FIG. - 3A

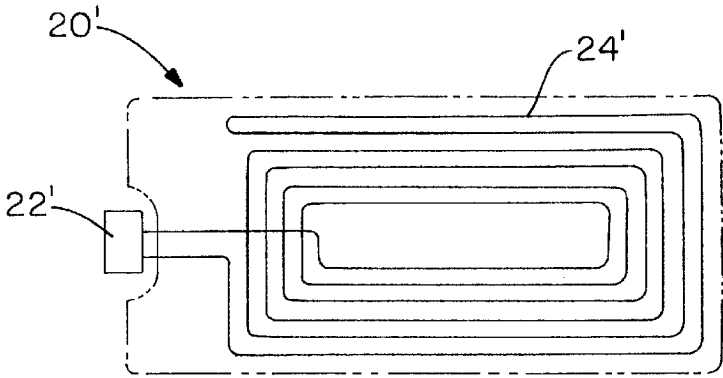


FIG. - 3B

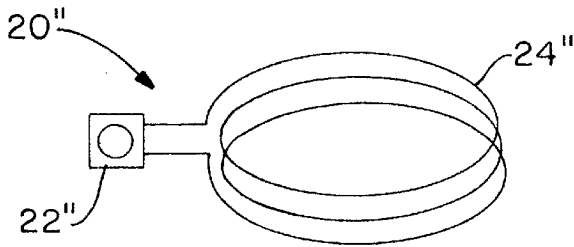


FIG. - 3C

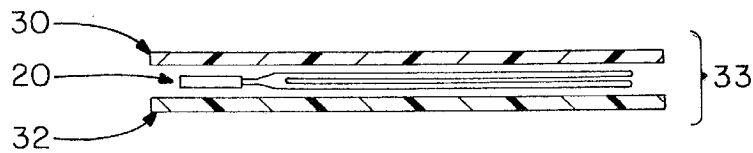


FIG. - 4

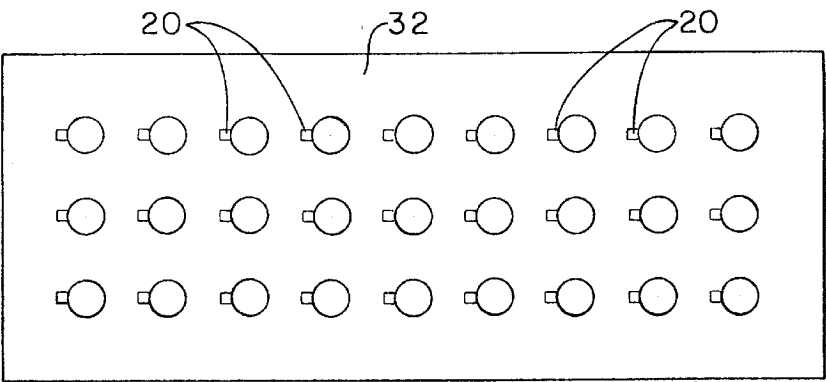


FIG. - 5

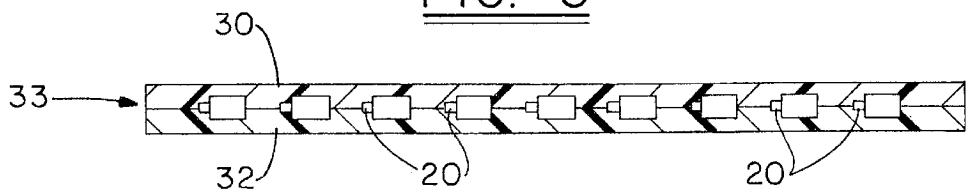


FIG. - 6

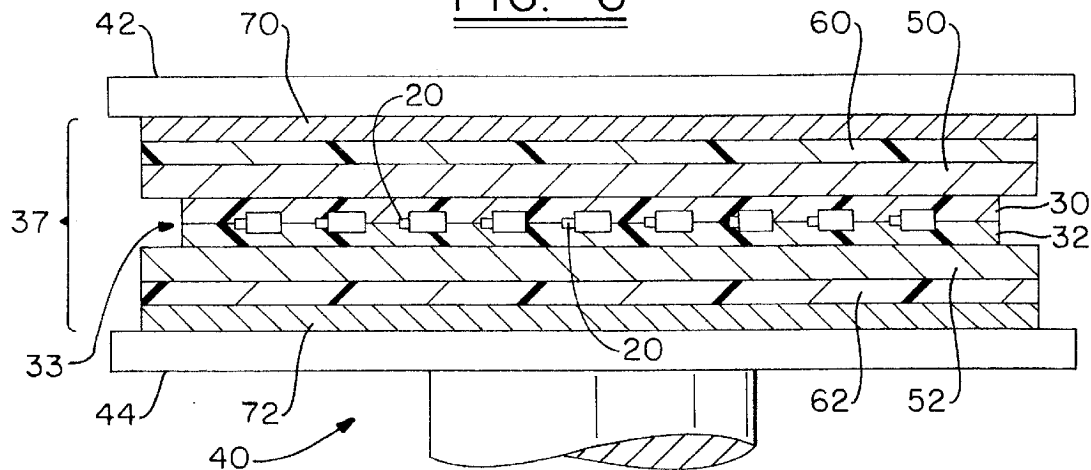
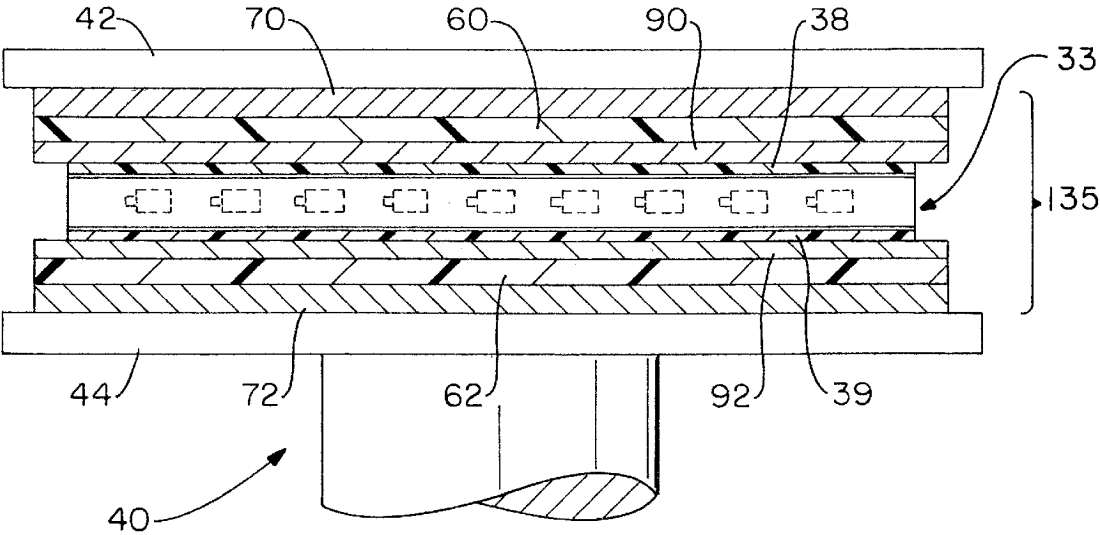
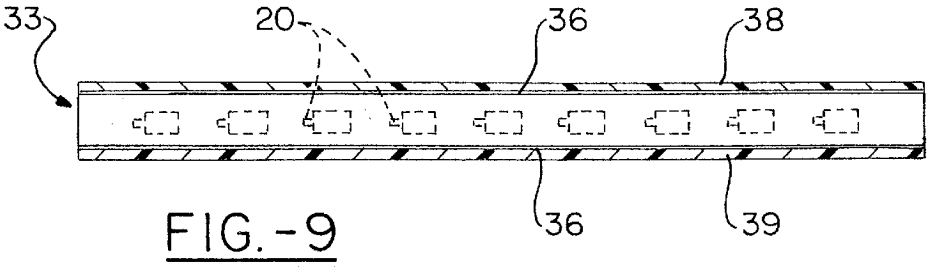
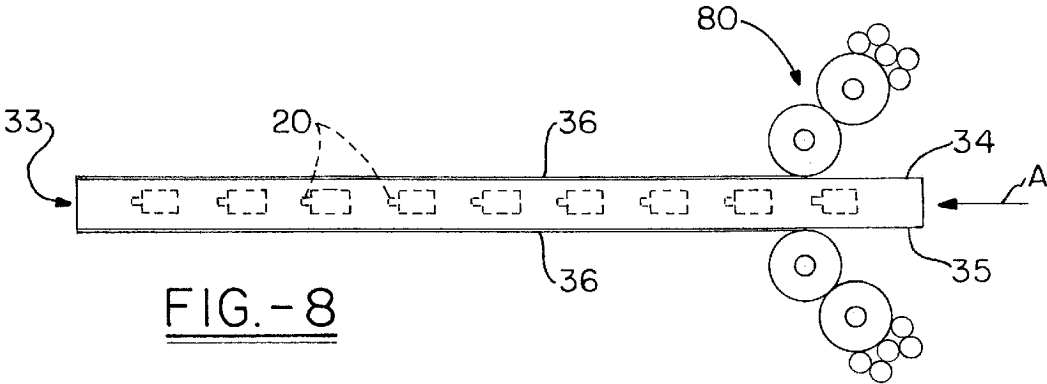


FIG. - 7



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**RADIO FREQUENCY IDENTIFICATION
CARD AND HOT LAMINATION PROCESS
FOR THE MANUFACTURE OF RADIO
FREQUENCY IDENTIFICATION CARDS**

This application claims the benefit of the following: U.S. Provisional Application No.: 60/005,685, filing date Oct. 17, 1995.

FIELD OF THE INVENTION

The present invention relates generally to plastic cards and the manufacture thereof, and more particularly to radio frequency identification (RFID) cards and the manufacture of RFID cards that conform to industry size and performance standards and conventions and that have a superior outer surface to known RFID cards such that card may receive dye sublimation printing or the like.

BACKGROUND OF THE INVENTION

As the use of plastic cards for credit cards, automated teller machine (ATM) cards, identification cards, and like continues to become more widespread, the problems associated with the use of such cards correspondingly increase. Credit card fraud and identification card fraud are becoming larger problems everyday, and this fraud has introduced uncertainties into our systems of commerce and our security systems. Using easily available technology, criminals are able to manufacture credit/debit cards, ATM cards, identification cards, and the like having another's account code, identification code, or other personal information embedded in the magnetic stripe thereof. Thus, for example, criminals may steal hundreds or thousands of legitimate credit card account numbers and manufacture many additional cards bearing the stolen information. These fraudulent cards are then usable by the criminals to purchase goods and to receive cash with the legitimate card holder and the card issuer left holding the bill. Likewise, so called debit cards are becoming increasingly popular. These cards have stored thereon a certain amount of value for which the card owner has previously paid. For example, a subway rider may purchase a card good for 50 fares, with one fare being deducted from the card each time the owner rides the subway. Criminals have also been able to manipulate the data stored on these cards to defraud the merchants and others.

The ease in which criminals have been able to manufacture and or manipulate known cards results from the existence of the easily altered magnetic stripe storage medium used by known cards. These magnetic stripes are easily programmed and reprogrammed using commonly available technology. Thus, there has been found a need in the plastic card industry to provide a more secure plastic card that is very difficult or impossible to fraudulently manipulate. The most likely solution to the above-noted problems associated with known plastic cards is the RFID card and other cards including computer chips embedded therein rather than, or in addition to, a magnetic stripe. While these RFID cards and like have been found to be successful in preventing or limiting fraud, they are more difficult and expensive to manufacture relative to ordinary magnetic stripe cards. One of the biggest obstacles to the wide spread manufacture and use of RFID cards has been the inability of card manufacturers to manufacturer an RFID card that meets all industry standards and specifications, such as those set by the International Standards Organization (ISO), that are sufficiently aesthetically pleasing (wherein the embedded electronics are

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hidden from view), and that have a sufficiently regular or flat surface such that one or both surfaces of the card may be printed on using the very popular and widespread dye sublimation technology. Known plastic cards with computer chips and like embedded therein are too thick to work in connection with existing card reading machinery (ATM machines, telephones, and like) and have a surface that is too irregular to properly and consistently receive dye sublimation printing. Furthermore, prior attempts to manufacture a sufficiently thin plastic card including a computer chip embedded therein have resulted in a card with inferior aesthetic qualities such as the ability to see the embedded computer chip through the plastic.

SUMMARY OF THE INVENTION

The present invention is therefore directed to a plastic card having at least one electronic element embedded therein and to a hot lamination method for the manufacture of plastic cards including at least one electronic element therein. The card has an overall thickness in the range of 0.028 inches to 0.032 inches and comprises a plastic core having at least one electronic element embedded therein with at least one of the upper and lower surfaces of the core comprising a coating printed or otherwise applied thereon. An overlamine film is preferably provided over the coated surface of the core and the resulting card has a variation in thickness across the surfaces thereof of no greater than approximately 0.0005 inches. The hot lamination method of the present invention comprises the steps of providing first and second plastic core sheets, positioning at least one electronic element between the first and second core sheets to thus form a core, and placing the core in a laminator and closing the laminator without applying laminator ram pressure to the core. A heat cycle is applied to the core sheets in the laminator thus liquefying or partially liquefying the sheets. The laminator ram pressure is then increased in combination with the heat. A cooling cycle is then applied to the core in the laminator, preferably with an associated increase in ram pressure, and the core is removed from the laminator. At least one surface of the core is then printed on using a printing press or similar printing apparatus, a sheet of overlamine film is placed on at least one side of the core, and the core is then again placed in a laminator. A heat cycle is applied to the core with its overlamine film, and a cooling cycle is thereafter applied, resulting in a sheet of plastic card stock from which one or more cards may be cut. The invention is also directed to a card manufactured in accordance with the above process which results in a plastic card having a thickness in the range of approximately 0.028 inches to 0.032 inches with a surface smoothness of at least approximately 0.0005 inches as is required by ISO and American National Standards Institute (ANSI) standards.

The present invention provides numerous advantages over known plastic cards and known plastic card manufacturing processes, including the formation of a plastic card with electronic elements such as a computer chip embedded therein with a pleasing aesthetic appearance, with a sufficiently smooth and regular surface such that the card may receive dye sublimation printing, and with sufficient durability and characteristics to comply with all industry specifications and standards.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a top plan view of a plastic card in accordance with the present invention;

FIG. 2 is a side elevational view of the card shown in FIG. 1;

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FIGS. 3A–3C are top plan views of various electronic elements that may be embedded in a card in accordance with the present invention;

FIG. 4 is an exploded, schematic view of an electronic element positioned between two plastic core sheets to form a core;

FIG. 5 is a top plan view of a plurality of electronic elements positioned on a sheet of plastic core stock such that they may be covered by a similar sheet of core stock;

FIG. 6 is a schematic cross-sectional view of one or more electronic elements positioned between sheets of plastic core stock;

FIG. 7 schematically illustrates a book comprising the core, as it is positioned in a laminator apparatus;

FIG. 8 schematically illustrates the core as it is being printed on after removal from the laminator using a printing press or similar printing apparatus;

FIG. 9 is a cross-sectional view schematically illustrating the application of an overlamine film to at least one side of the core;

FIG. 10 schematically illustrates the core with overlamine film, as it is placed in a laminator for final processing to form a sheet of card stock.

DETAILED DESCRIPTION OF THE INVENTION

The present invention relates to a plastic card including at least one electronic element embedded therein. The present invention also relates to a hot lamination process for the manufacture of plastic cards, and more particularly to a hot lamination process for the manufacturer of plastic cards that include an electronic element, such as a computer chip or other electronic element embedded therein. The electronic element may perform a wide variety of functions and take a wide variety of forms. Such cards, without regard to the particular electronic element embedded therein, will hereinafter be referred to as radio frequency identification (RFID) cards. The present invention also relates to a card formed in accordance with the invention.

Referring now to FIG. 1, there can be seen a plastic RFID card 10 manufactured in accordance with the present invention and including an electronic element 20 embedded therein. Card 10 includes an upper surface 12 and a lower surface 14. Electronic element 20 may take a wide variety of forms and perform a wide variety of functions. As shown in FIGS. 3A–3C respectively, electronic element 20, 20', 20" may be provided by a micro-chip 22 including a wire antenna 24 connected thereto, a micro-chip 22' and a circuit board antenna 24', a read/write micro-chip 22" and a wire coil antenna 24", or any other suitable electronic element. These electronic elements 20, 20', 20" and their insertion into plastic cards is not new, however, the present invention provides a new hot lamination process for manufacturing plastic cards 10 with these electronic elements 20, 20', 20" embedded therein such that the cards 10 are of a superior quality, such that the cards 10 meet all ISO and other industry specifications and standards, in such that at least one of the upper and lower surfaces 12, 14 of card 10 is sufficiently smooth and is otherwise is capable of receiving dye sublimation printing. Specifically, a card in accordance with the present invention has a thickness of approximately in the range of 0.028 inches to 0.032 inches with a surface smoothness of 0.0005 inches.

As shown in FIGS. 4–10 one or more cards 10 in accordance with the present invention may be manufactured

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by positioning an electronic element 20 between first and second sheets of card stock 30, 32 to form a core 33. Preferably is shown in FIG. 5–10, a plurality of cards are manufactured simultaneously, in thus, a plurality of electronic elements 20 are positioned between the first and second sheets of plastic core stock 30, 32 (only the second sheet 32 begin shown in FIG. 5 for clarity). When a plurality of electronic elements 20 are positioned between first and second sheets plastic core stock 30, 32, electronic elements 20 are properly positioned relative to one another such that a plurality cards may be cut from the resulting card stock. Plastic core sheets 30, 32 may be provided by a wide variety of plastics, the preferred being polyvinyl chloride (PVC) having a thickness in the range of 0.007 inches to 0.024 inches and preferably having a thickness of approximately 0.0125 inches each. Those skilled in the art will recognize that the thickness of the plastic core sheets will depend upon the thickness of the one or more electronic elements that are to be embedded therebetween. Other suitable plastics that may be utilized include polyester, acrylonitrile-butadiene-styrene (ABS), and any other suitable plastic.

Subsequent to placing one or more electronic elements 20 between the first and second sheets 30, 32 of plastic core stock to form a core 33, this core 33 is placed in a laminator apparatus 40 of the type well known in the art of plastic card manufacturing. As is shown in FIG. 7, laminator 40 includes upper and lower platens 42,44 for applying ram pressure to an article positioned therebetween. In addition to the ability to apply ram pressure, laminator 40 is preferably of the type having controlled platens 42,44 that may provide both heat and chill cycles and preferably includes cycle timer to regulate cycle time. Core 33 is positioned between first and second laminating plates 50, 52, one of which is preferably matte finished to provide laminated core 33 with at least one textured outer surface. First and second laminating pads 60, 62 are positioned outside of the laminating plates 50, 52, and first and second steel plates 70, 72 are likewise positioned outside of pads of 60, 62 and the entire assembly forms a book 35 for being positioned in laminator 40 between platens 42, 44.

Once book 35 is positioned in laminator 40 as shown in FIG. 7, the first lamination cycle is initiated by closing laminator platens 42, 44, preferably applying little or no ram pressure to book 35. A laminator heat cycle is initiated, bringing the temperature of platens 42,44 up to a range of 275° F. to 400° F., and most preferably up to a range of 300° F. to 370° F. for a period of greater than 5 minutes, and preferably in the range of 7 to 10 minutes. Once the heat cycle has been applied to the book 35 as is set forth above, the ram pressure of laminator 40 is increased to facilitate the flow of the plastic core sheets 30, 32 so that the one or more electronic elements 20 are encapsulated there by, and so that sheets 30, 32 form a uniform core 33 (seen most clearly in FIGS. 8–10) with upper and lower surfaces 34,35. As mentioned, the use of matte finished laminator plates 50,52 provides surfaces 34,35 with a slightly roughened or textured quality which will facilitate the application of a coating thereto as is discussed below. The ram pressure applied during the heat cycle and the length of the heat cycle may vary, depending especially upon the size of sheets 30, 32. For example, the cycle time may be in the range of 10–15 minutes. In one example, a ram pressure of 940.135 pounds per square inch (p.s.i.) was applied for 10–15 minutes to form a uniform core 33, using sheets 30,32 of a size in the range of 12 inches by 24 inches to 24 inches by 36 inches.

Subsequent to the above heat cycle, laminator 40 applies a chill cycle to book 35 during which time the ram pressure

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of the laminator 40 is increased, preferably by approximately 25% until the platens 42,44 have cooled to approximately 40° F. to 65° F. for approximately 10–15 minutes. Core 33 may then be removed from laminator 40 for additional processing.

Subsequent to the removal of core 33 from laminator 40, and as illustrated in FIG. 8, core 33 is coated on at least one of its upper and lower surfaces 34, 35 with a layer of printing ink 36. This may be accomplished using a wide variety of printing techniques such as offset printing, letterpress printing, screen printing, roller coating, spray printing, litho-printing, and other suitable printing techniques. As shown in FIG. 8, core 33 is fed in the direction indicated with arrow A through a printing press, a lithographic printer, or a similar apparatus 80. This printing step is performed to coat at least one surface 34, 35 of core 33 with a layer of aesthetically pleasing ink 36. This layer of ink 36 cosmetically hides the one or more electronic elements 20 that are embedded within core 33, and prevents these one or more electronic elements 20 from showing through the relatively thin core 33. In this manner, the one or more electronic elements 20 encapsulated in core 33 are completely hidden from view without requiring the plastic used in the manufacture core 33 to be excessively thick.

Referring now to FIGS. 9–10, the final processing of core 33, which now comprises a layer of ink 36 or the like on at least one surface 34,35 thereof, is schematically illustrated. A layer of overlamine film such as clear overlamine film 38,39 is positioned on at least one ink coated surface 34,35 of core 33, and preferably core 33 is positioned between two similar sheets of overlamine film 38,39 as shown. Overlamine film is very thin, for example in the range of 0.0015" thick. A book 135 is then constructed for insertion into laminator 40 as is schematically illustrated FIG. 10. Book 135 comprising core 33, including at least one layer of ink 36 and at least one layer of overlamine film 38, 39 is positioned between laminating plates which are preferably highly polished plates such as mirror finished stainless steel plates 90, 92. Book 135 also comprises first and second laminating pads 60, 62 and first and second steel plates 70, 72 as is discussed above in relation to FIG. 7.

When book 135 is positioned between upper and lower platens 42,44 of laminator 40 as shown in FIG. 10, the laminator is closed and a heat cycle in the range of 175° F. to 300° F., and most preferably in the range of 180° F. to 275° F., is applied to book 135 for a period of 10 to 25 minutes with a ram pressure that varies depending upon sheet size or the ram size of the laminator 40, but which is typically approximately 1000 p.s.i. with an 18 inch diameter ram. The laminator 40 is then caused to execute a chill cycle, preferably with a corresponding increase in ram pressure. For example, the chill temperature may be in the range of 40° F. to 65° F. and last for a period of 10 to 25 minutes. A ram pressure increase of approximately 25% over the pressure used for the heat cycle has been found to be most preferable.

Subsequent to the above described second lamination cycle as illustrated in FIG. 10, a sheet of plastic card stock is provided which comprises at least core 33 with at least one surface 34,35 thereof covered by a layer of ink 36, and with at least one surface 34,35 thereof covered by a layer of overlamine film 38, 39. Preferably plastic card stock manufactured in accordance with the present invention comprises core 33 covered on both surfaces 34,35 with a layer of ink 36 which is positioned between layers of overlamine film 38,39, all of which has been laminated together as described. One or more cards 10 then may be cut

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from the resulting plastic card stock and card 10 will have a thickness in the range of 0.028 inches to 0.032 inches with variation in overall thickness across the surfaces 12, 14 thereof being no greater than approximately 0.0005 inches.

5 The one or more cards 10 can thus be said to have a surface smoothness of approximately 0.0005 inches or better. Thus, a card 10 manufactured in accordance with the present invention includes at least one surface 12,14 at preferably both surfaces 12,14 that are sufficiently smooth and regular to receive dye sublimation printing.

Those skilled in the art will recognize that the foregoing description has set forth the preferred embodiment of the invention in particular detail and it must be understood that numerous modifications, substitutions, and changes may be undertaken without departing from the true spirit and scope of the present invention as defined by the ensuing claims.

What is claimed is:

1. A process for incorporating at least one electronic element in the manufacture of a plastic card, comprising the steps of:

- (a) providing first and second plastic core sheets;
- (b) positioning said at least one electronic element in the absence of a non-electronic carrier directly between said first and second plastic core sheets to form a core, said plastic core sheets defining a pair of inner and outer surfaces of said core;
- (c) positioning said core in a laminator apparatus, and subjecting said core to a heat and pressure cycle, said heat and pressure cycle comprising the steps of:
 - (i) heating said core for a first period of time;
 - (ii) applying a first pressure to said core for a second period of time such that said at least one electronic element is encapsulated by said core;
 - (iii) cooling said core while applying a second pressure to said core,
- (d) coating at least one of said outer surfaces of said core with a layer of ink; and
- (e) applying a layer of overlamine film to at least one of said outer surfaces of said core.

2. The process for incorporating at least one electronic element in the manufacture of a plastic card as recited in claim 1, wherein said laminator apparatus has first and second laminating plates, at least one of said first and second laminating plates having a matte finish for creating a textured surface on at least one of said outer surfaces of said core.

3. The process for incorporating at least one electronic element in the manufacture of a plastic card as recited in claim 2, wherein each of said first and second laminating plates has a matte finish for creating said textured surface on both of said outer surfaces of said core.

4. The process for incorporating at least one electronic element in the manufacture of a plastic card as recited in claim 1, wherein said first and second plastic core sheets are made from a material selected from the group consisting of polyvinyl chloride, polyester, and acrylonitrile-butadiene-styrene, each of said sheets having a thickness in the range of 0.007 to 0.024 inch.

5. The process for incorporating at least one electronic element in the manufacture of a plastic card as recited in claim 4, wherein said first and second plastic core sheets have a thickness of approximately 0.0125 inch.

6. The process for incorporating at least one electronic element in the manufacture of a plastic card as recited in claim 1, wherein said second pressure is greater than said first pressure.

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7. The process for incorporating at least one electronic element in the manufacture of a plastic card as recited in claim 6, wherein said second pressure is at least approximately 25% greater than said first pressure.

8. The process for incorporating at least one electronic element in the manufacture of a plastic card as recited in claim 1, wherein said core is heated in step (c)(i) to a temperature in the range of 275° F. to 400° F. and said first period of time is at least five (5) minutes.

9. The process for incorporating at least one electronic element in the manufacture of a plastic card as recited in claim 1, wherein said first pressure is approximately 1000 p.s.i. and said second period of time is at least 10 minutes.

10. The process for incorporating at least one electronic element in the manufacture of a plastic card as recited in claim 1, wherein said step (d) is carried out utilizing a printing press.

11. The process for incorporating at least one electronic element in the manufacture of a plastic card as recited in claim 1, wherein said step (d) is carried out utilizing a coating technique selected from the group consisting of silk screen printing, offset printing, letterpress printing, screen printing, roller coating, spray printing, and litho-printing.

12. The process for incorporating at least one electronic element in the manufacture of a plastic card as recited in claim 1, wherein said step (e) of applying a layer of overlamine film comprises the further steps of:

- (a) positioning an overlamine film on at least one ink coated surface of said core;
- (b) subjecting said core to a second heat and pressure cycle comprising the steps of:
 - (i) heating said core to a temperature between approximately 175° F. to 300° F. for approximately 10 to 25 minutes;
 - (ii) applying approximately 1000 p.s.i. pressure to said core; and
 - (iii) cooling said core to a temperature in the range of approximately 40° F. to 65° F. for approximately 10 to 25 minutes.

13. The process for incorporating at least one electronic element in the manufacture of a plastic card as recited in

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claim 1, wherein said at least one electronic element is a micro-chip and an associated wire antenna.

14. The process for incorporating at least one electronic element in the manufacture of a plastic card as recited in claim 1, wherein said at least one electronic element is a micro-chip and an associated circuit board antenna.

15. The process for incorporating at least one electronic element in the manufacture of a plastic card as recited in claim 1, wherein said at least one electronic element is a read/write integrated chip and an associated antenna.

16. A hot lamination process for the manufacture of plastic cards, said process comprising the steps of:

- (a) providing first and second plastic core sheets;
- (b) positioning at least one electronic element in the absence of a non-electronic carrier directly between said first and second plastic core sheets to form a layered core;
- (c) positioning said core in a laminator apparatus, and subjecting said core to a heat and pressure cycle, said heat and pressure cycle comprising the steps of:
 - (i) heating said core in said laminator, in the presence of a minimal first ram pressure, to a temperature which causes controlled flow of said plastic which makes up said first and second plastic core sheets;
 - (ii) applying a second pressure uniformly across said core for encapsulating said at least one electronic element within said controlled flow plastic;
 - (iii) subsequently cooling said core in conjunction with the concurrent application of a third pressure uniformly across said core, said core including and upper and lower surfaces;
- (d) printing on at least one of said upper and lower surfaces of said core such that a layer of ink is applied to at least a portion of said at least one upper and lower surface of said core.

17. The method as recited in claim 16 wherein said first and second core layers are devoid of any appreciable cut-outs.

* * * * *

EXHIBIT 2

(12) **United States Patent**
Leighton

(10) **Patent No.:** **US 6,214,155 B1**
(45) **Date of Patent:** **Apr. 10, 2001**

- (54) **RADIO FREQUENCY IDENTIFICATION CARD AND HOT LAMINATION PROCESS FOR THE MANUFACTURE OF RADIO FREQUENCY IDENTIFICATION CARDS**
- (76) Inventor: **Keith R. Leighton**, 2817 Fulmer Rd., Lorain, OH (US) 44053
- (*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

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- (21) Appl. No.: **09/158,290**
- (22) Filed: **Sep. 22, 1998**

Related U.S. Application Data

- (63) Continuation of application No. 08/727,789, filed on Oct. 7, 1996, now Pat. No. 5,817,207.
- (60) Provisional application No. 60/005,685, filed on Oct. 17, 1995.
- (51) **Int. Cl.⁷** **B32B 31/20**
- (52) **U.S. Cl.** **156/298; 156/312**
- (58) **Field of Search** **156/298, 312**

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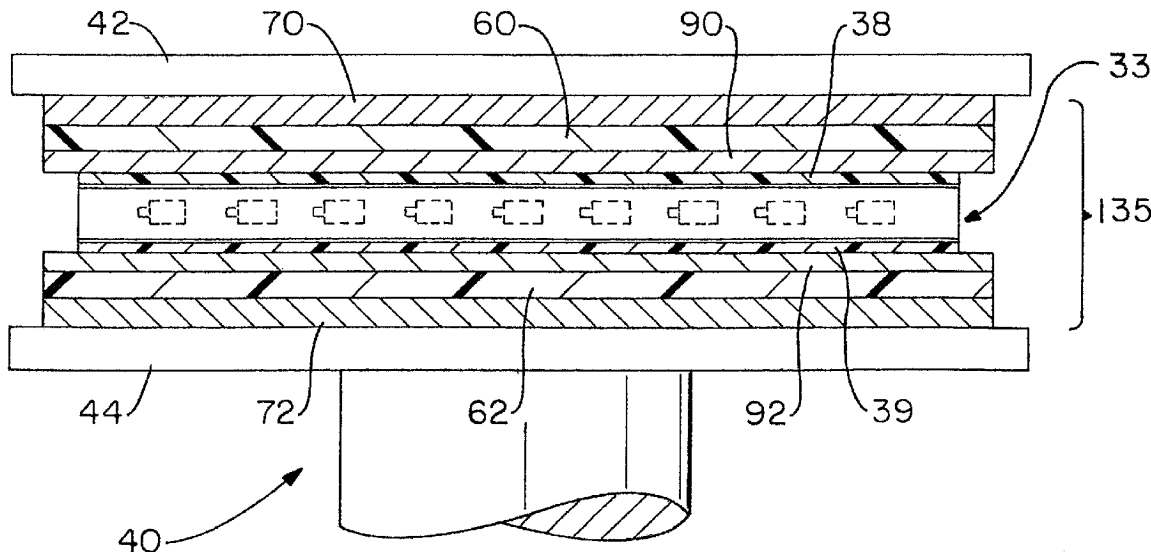
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Primary Examiner—Francis J. Lorin
(74) *Attorney, Agent, or Firm*—Oldham & Oldham Co., L.P.A.

(57) **ABSTRACT**

A plastic card, such as a radio frequency identification card, including at least one electronic element embedded therein and a hot lamination process for the manufacture of radio frequency identification cards and other plastic cards including a micro-chip embedded therein. The process results in a card having an overall thickness in the range of 0.028 inches to 0.032 inches with a surface suitable for receiving dye sublimation printing—the variation in card thickness across the surface is less than 0.0005 inches. A card manufactured in accordance with the present invention also complies with all industry standards and specifications. Also, the hot lamination process of the present invention results in an aesthetically pleasing card. The invention also relates to a plastic card formed in accordance with the hot lamination process of the present invention.

16 Claims, 3 Drawing Sheets



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Apr. 10, 2001

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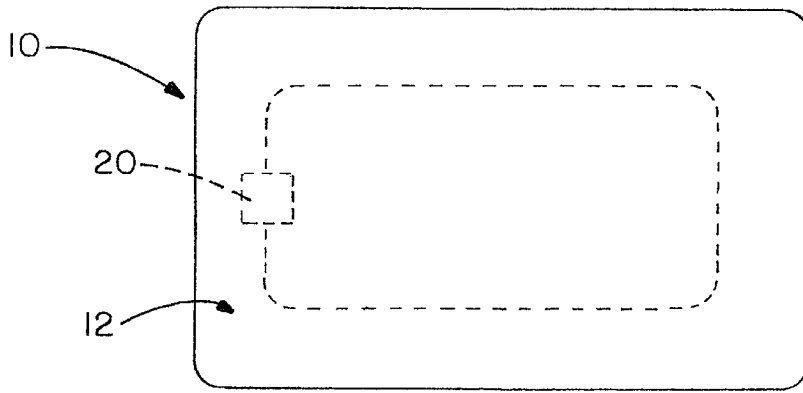


FIG. - 1

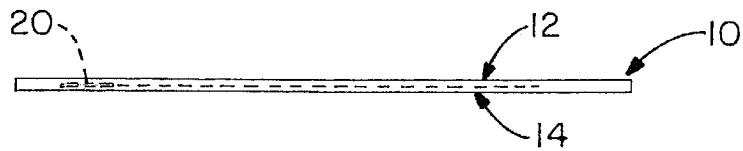


FIG. - 2

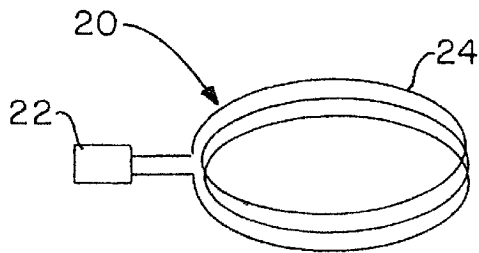


FIG. - 3A

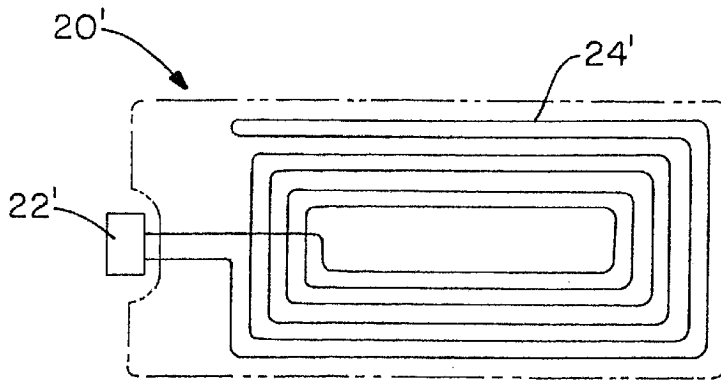


FIG. - 3B

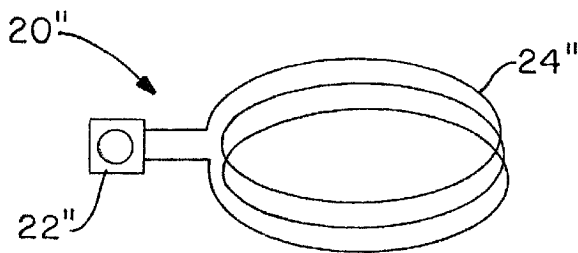


FIG. - 3C

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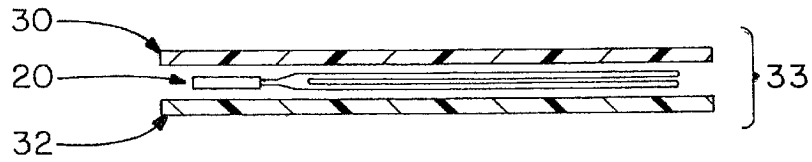


FIG. - 4

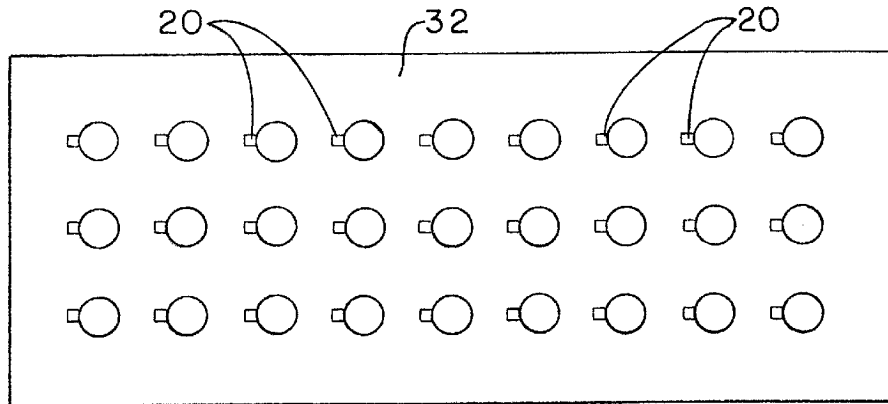


FIG. - 5

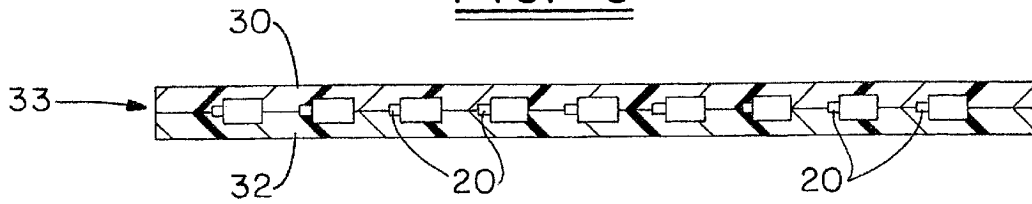


FIG. - 6

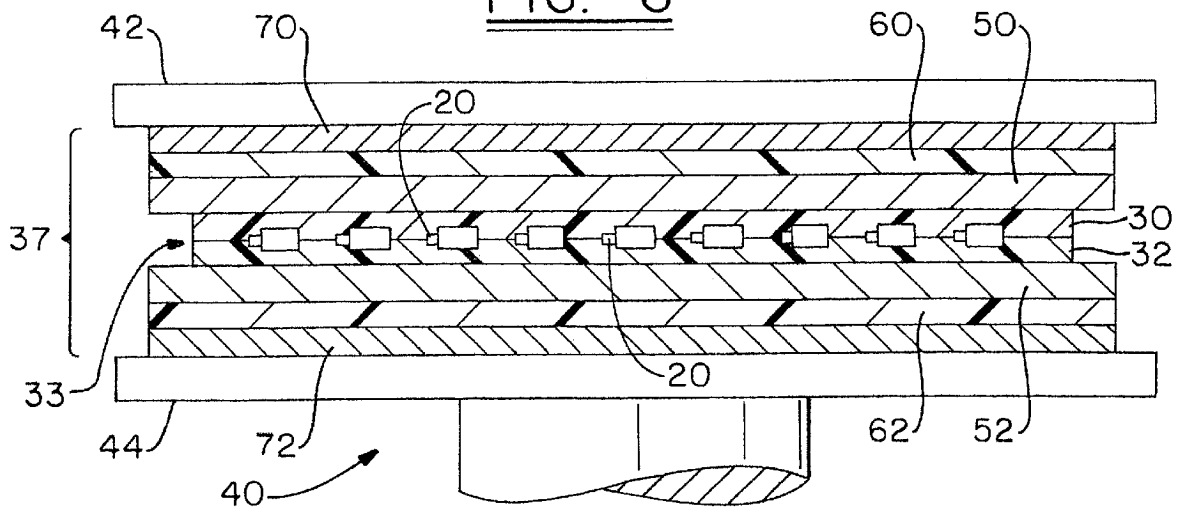
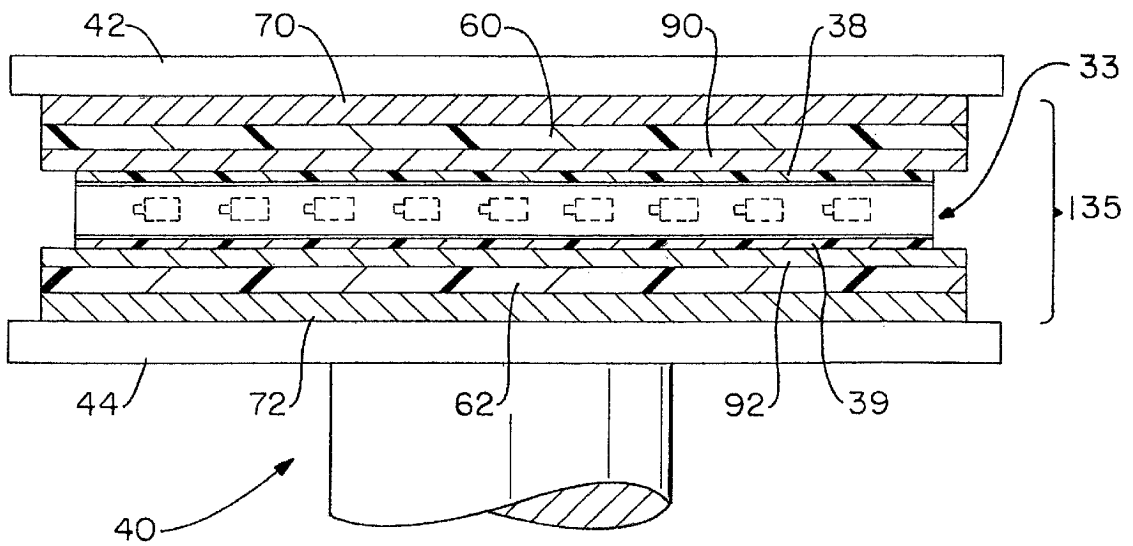
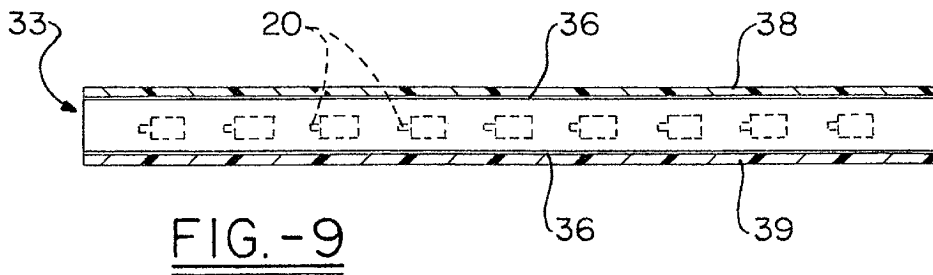
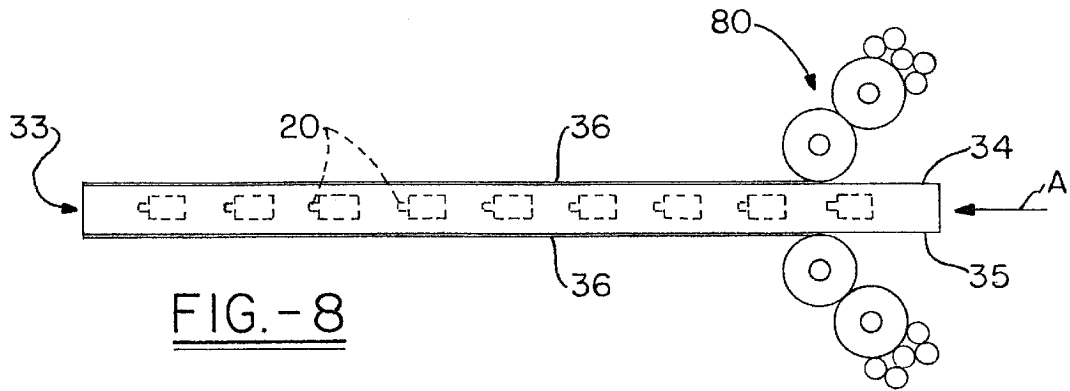


FIG. - 7



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RADIO FREQUENCY IDENTIFICATION CARD AND HOT LAMINATION PROCESS FOR THE MANUFACTURE OF RADIO FREQUENCY IDENTIFICATION CARDS

This application is a continuation of Ser. No. 08/727,789, now U.S. Pat. No. 5,817,207 which claim the benefit of provision of application 60/005,685 filed on Oct. 17, 1995.

FIELD OF THE INVENTION

The present invention relates generally to plastic cards and the manufacture thereof, and more particularly to radio frequency identification (RFID) cards and the manufacture of RFID cards that conform to industry size and performance standards and conventions and that have a superior outer surface to known RFID cards such that card may receive dye sublimation printing or the like.

BACKGROUND OF THE INVENTION

As the use of plastic cards for credit cards, automated teller machine (ATM) cards, identification cards, and like continues to become more widespread, the problems associated with the use of such cards correspondingly increase. Credit card fraud and identification card fraud are becoming larger problems everyday, and this fraud has introduced uncertainties into our systems of commerce and our security systems. Using easily available technology, criminals are able to manufacture credit/debit cards, ATM cards, identification cards, and the like having another's account code, identification code, or other personal information embedded in the magnetic stripe thereof. Thus, for example, criminals may steal hundreds or thousands of legitimate credit card account numbers and manufacture many additional cards bearing the stolen information. These fraudulent cards are then usable by the criminals to purchase goods and to receive cash with the legitimate card holder and the card issuer left holding the bill. Likewise, so called debit cards are becoming increasingly popular. These cards have stored thereon a certain amount of value for which the card owner has previously paid. For example, a subway rider may purchase a card good for 50 fares, with one fare being deducted from the card each time the owner rides the subway. Criminals have also been able to manipulate the data stored on these cards to defraud the merchants and others.

The ease in which criminals have been able to manufacture and or manipulate known cards results from the existence of the easily altered magnetic stripe storage medium used by known cards. These magnetic stripes are easily programmed and reprogrammed using commonly available technology. Thus, there has been found a need in the plastic card industry to provide a more secure plastic card that is very difficult or impossible to fraudulently manipulate. The most likely solution to the above-noted problems associated with known plastic cards is the RFID card and other cards including computer chips embedded therein rather than, or in addition to, a magnetic stripe. While these RFID cards and like have been found to be successful in preventing or limiting fraud, they are more difficult and expensive to manufacture relative to ordinary magnetic stripe cards. One of the biggest obstacles to the wide spread manufacture and use of RFID cards has been the inability of card manufacturers to manufacture an RFID card that meets all industry standards and specifications, such as those set by the International Standards Organization (ISO), that are sufficiently aesthetically pleasing (wherein the embedded electronics are

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hidden from view), and that have a sufficiently regular or flat surface such that one or both surfaces of the card may be printed on using the very popular and widespread dye sublimation technology. Known plastic cards with computer chips and like embedded therein are too thick to work in connection with existing card reading machinery (ATM machines, telephones, and like) and have a surface that is too irregular to properly and consistently receive dye sublimation printing. Furthermore, prior attempts to manufacture a sufficiently thin plastic card including a computer chip embedded therein have resulted in a card with inferior aesthetic qualities such as the ability to see the embedded computer chip through the plastic.

SUMMARY OF THE INVENTION

The present invention is therefore directed to a plastic card having at least one electronic element embedded therein and to a hot lamination method for the manufacture of plastic cards including at least one electronic element therein. The card has an overall thickness in the range of 0.028 inches to 0.032 inches and comprises a plastic core having at least one electronic element embedded therein with at least one of the upper and lower surfaces of the core comprising a coating printed or otherwise applied thereon. An overlamine film is preferably provided over the coated surface of the core and the resulting card has a variation in thickness across the surfaces thereof of no greater than approximately 0.0005 inches. The hot lamination method of the present invention comprises the steps of providing first and second plastic core sheets, positioning at least one electronic element between the first and second core sheets to thus form a core, and placing the core in a laminator and closing the laminator without applying laminator ram pressure to the core. A heat cycle is applied to the core sheets in the laminator thus liquefying or partially liquefying the sheets. The laminator ram pressure is then increased in combination with the heat. A cooling cycle is then applied to the core in the laminator, preferably with an associated increase in ram pressure, and the core is removed from the laminator. At least one surface of the core is then printed on using a printing press or similar printing apparatus, a sheet of overlamine film is placed on at least one side of the core, and the core is then again placed in a laminator. A heat cycle is applied to the core with its overlamine film, and a cooling cycle is thereafter applied, resulting in a sheet of plastic card stock from which one or more cards may be cut. The invention is also directed to a card manufactured in accordance with the above process which results in a plastic card having a thickness in the range of approximately 0.028 inches to 0.032 inches with a surface smoothness of at least approximately 0.0005 inches as is required by ISO and American National Standards Institute (ANSI) standards.

The present invention provides numerous advantages over known plastic cards and known plastic card manufacturing processes, including the formation of a plastic card with electronic elements such as a computer chip embedded therein with a pleasing aesthetic appearance, with a sufficiently smooth and regular surface such that the card may receive dye sublimation printing, and with sufficient durability and characteristics to comply with all industry specifications and standards.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a top plan view of a plastic card in accordance with the present invention;

FIG. 2 is a side elevational view of the card shown in FIG. 1;

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FIGS. 3A–3C are top plan views of various electronic elements that may be embedded in a card in accordance with the present invention;

FIG. 4 is an exploded, schematic view of an electronic element positioned between two plastic core sheets to form a core;

FIG. 5 is a top plan view of a plurality of electronic elements positioned on a sheet of plastic core stock such that they may be covered by a similar sheet of core stock;

FIG. 6 is a schematic cross-sectional view of one or more electronic elements positioned between sheets of plastic core stock;

FIG. 7 schematically illustrates a book comprising the core, as it is positioned in a laminator apparatus;

FIG. 8 schematically illustrates the core as it is being printed on after removal from the laminator using a printing press or similar printing apparatus;

FIG. 9 is a cross-sectional view schematically illustrating the application of an overlamine film to at least one side of the core;

FIG. 10 schematically illustrates the core with overlamine film, as it is placed in a laminator for final processing to form a sheet of card stock.

DETAILED DESCRIPTION OF THE INVENTION

The present invention relates to a plastic card including at least one electronic element embedded therein. The present invention also relates to a hot lamination process for the manufacture of plastic cards, and more particularly to a hot lamination process for the manufacturer of plastic cards that include an electronic element, such as a computer chip or other electronic element embedded therein. The electronic element may perform a wide variety of functions and take a wide variety of forms. Such cards, without regard to the particular electronic element embedded therein, will hereinafter be referred to as radio frequency identification (RFID) cards. The present invention also relates to a card formed in accordance with the invention.

Referring now to FIG. 1, there can be seen a plastic RFID card 10 manufactured in accordance with the present invention and including an electronic element 20 embedded therein. Card 10 includes an upper surface 12 and a lower surface 14. Electronic element 20 may take a wide variety of forms and perform a wide variety of functions. As shown in FIGS. 3A–3C respectively, electronic element 20, 20', 20" may be provided by a micro-chip 22 including a wire antenna 24 connected thereto, a micro-chip 22' and a circuit board antenna 24', a read/write micro-chip 22" and a wire coil antenna 24", or any other suitable electronic element. These electronic elements 20, 20', 20" and their insertion into plastic cards is not new, however, the present invention provides a new hot lamination process for manufacturing plastic cards 10 with these electronic elements 20, 20', 20" embedded therein such that the cards 10 are of a superior quality, such that the cards 10 meet all ISO and other industry specifications and standards, in such that at least one of the upper and lower surfaces 12, 14 of card 10 is sufficiently smooth and is otherwise is capable of receiving dye sublimation printing. Specifically, a card in accordance with the present invention has a thickness of approximately in the range of 0.028 inches to 0.032 inches with a surface smoothness of 0.0005 inches.

As shown in FIGS. 4–10 one or more cards 10 in accordance with the present invention may be manufactured

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by positioning an electronic element 20 between first and second sheets of card stock 30, 32 to form a core 33. Preferably is shown in FIGS. 5–10, a plurality of cards are manufactured simultaneously, in thus, a plurality of electronic elements 20 are positioned between the first and second sheets of plastic core stock 30, 32 (only the second sheet 32 begin shown in FIG. 5 for clarity). When a plurality of electronic elements 20 are positioned between first and second sheets plastic core stock 30, 32, electronic elements 20 are properly positioned relative to one another such that a plurality cards may be cut from the resulting card stock. Plastic core sheets 30, 32 may be provided by a wide variety of plastics, the preferred being polyvinyl chloride (PVC) having a thickness in the range of 0.007 inches to 0.024 inches and preferably having a thickness of approximately 0.0125 inches each. Those skilled in the art will recognize that the thickness of the plastic core sheets will depend upon the thickness of the one or more electronic elements that are to be embedded therebetween. Other suitable plastics that may be utilized include polyester, acrylonitrile-butadiene-styrene (ABS), and any other suitable plastic.

Subsequent to placing one or more electronic elements 20 between the first and second sheets 30, 32 of plastic core stock to form a core 33, this core 33 is placed in a laminator apparatus 40 of the type well known in the art of plastic card manufacturing. As is shown in FIG. 7, laminator 40 includes upper and lower platens 42, 44 for applying ram pressure to an article positioned therebetween. In addition to the ability to apply ram pressure, laminator 40 is preferably of the type having controlled platens 42, 44 that may provide both heat and chill cycles and preferably includes cycle timer to regulate cycle time. Core 33 is positioned between first and second laminating plates 50, 52, one of which is preferably matte finished to provide laminated core 33 with at least one textured outer surface. First and second laminating pads 60, 62 are positioned outside of the laminating plates 50, 52, and first and second steel plates 70, 72 are likewise positioned outside of pads of 60, 62 and the entire assembly forms a book 35 for being positioned in laminator 40 between platens 42, 44.

Once book 35 is positioned in laminator 40 as shown in FIG. 7, the first lamination cycle is initiated by closing laminator platens 42, 44, preferably applying little or no ram pressure to book 35. A laminator heat cycle is initiated, bringing the temperature of platens 42, 44 up to a range of 275° F. to 400° F., and most preferably up to a range of 300° F. to 370° F. for a period of greater than 5 minutes, and preferably in the range of 7 to 10 minutes. Once the heat cycle has been applied to the book 35 as is set forth above, the ram pressure of laminator 40 is increased to facilitate the flow of the plastic core sheets 30, 32 so that the one or more electronic elements 20 are encapsulated there by, and so that sheets 30, 32 form a uniform core 33 (seen most clearly in FIGS. 8–10) with upper and lower surfaces 34, 35. As mentioned, the use of matte finished laminator plates 50, 52 provides surfaces 34, 35 with a slightly roughened or textured quality which will facilitate the application of a coating thereto as is discussed below. The ram pressure applied during the heat cycle and the length of the heat cycle may vary, depending especially upon the size of sheets 30, 32. For example, the cycle time may be in the range of 10–15 minutes. In one example, a ram pressure of 940.135 pounds per square inch (p.s.i.) was applied for 10–15 minutes to form a uniform core 33, using sheets 30, 32 of a size in the range of 12 inches by 24 inches to 24 inches by 36 inches.

Subsequent to the above heat cycle, laminator 40 applies a chill cycle to book 35 during which time the ram pressure

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of the laminator **40** is increased, preferably by approximately 25% until the platens **42, 44** have cooled to approximately 40° F. to 65° F. for approximately 10–15 minutes. Core **33** may then be removed from laminator **40** for additional processing.

Subsequent to the removal of core **33** from laminator **40**, and as illustrated in FIG. **8**, core **33** is coated on at least one of its upper and lower surfaces **34, 35** with a layer of printing ink **36**. This may be accomplished using a wide variety of printing techniques such as offset printing, letterpress printing, screen printing, roller coating, spray printing, litho-printing, and other suitable printing techniques. As shown in FIG. **8**, core **33** is fed in the direction indicated with arrow **A** through a printing press, a lithographic printer, or a similar apparatus **80**. This printing step is performed to coat at least one surface **34, 35** of core **33** with a layer of aesthetically pleasing ink **36**. This layer of ink **36** cosmetically hides the one or more electronic elements **20** that are embedded within core **33**, and prevents these one or more electronic elements **20** from showing through the relatively thin core **33**. In this manner, the one or more electronic elements **20** encapsulated in core **33** are completely hidden from view without requiring the plastic used in the manufacture core **33** to be excessively thick.

Referring now to FIGS. 9–10, the final processing of core **33**, which now comprises a layer of ink **36** or the like on at least one surface **34, 35** thereof, is schematically illustrated. A layer of overlamine film such as clear overlamine film **38, 39** is positioned on at least one ink coated surface **34, 35** of core **33**, and preferably core **33** is positioned between two similar sheets of overlamine film **38, 39** as shown. Overlamine film is very thin, for example in the range of 0.0015" thick. A book **135** is then constructed for insertion into laminator **40** as is schematically illustrated FIG. **10**. Book **135** comprising core **33**, including at least one layer of ink **36** and at least one layer of overlamine film **38, 39** is positioned between laminating plates which are preferably highly polished plates such as mirror finished stainless steel plates **90, 92**. Book **135** also comprises first and second laminating pads **60, 62** and first and second steel plates **70, 72** as is discussed above in relation to FIG. **7**.

When book **135** is positioned between upper and lower platens **42, 44** of laminator **40** as shown in FIG. **10**, the laminator is closed and a heat cycle in the range of 175° F. to 300° F., and most preferably in the range of 180° F. to 275° F., is applied to book **135** for a period of 10 to 25 minutes with a ram pressure that varies depending upon sheet size or the ram size of the laminator **40**, but which is typically approximately 1000 p.s.i. with an 18 inch diameter ram. The laminator **40** is then caused to execute a chill cycle, preferably with a corresponding increase in ram pressure. For example, the chill temperature may be in the range of 40° F. to 65° F. and last for a period of 10 to 25 minutes. A ram pressure increase of approximately 25% over the pressure used for the heat cycle has been found to be most preferable.

Subsequent to the above described second lamination cycle as illustrated in FIG. **10**, a sheet of plastic card stock is provided which comprises at least core **33** with at least one surface **34, 35** thereof covered by a layer of ink **36**, and with at least one surface **34, 35** thereof covered by a layer of overlamine film **38, 39**. Preferably plastic card stock manufactured in accordance with the present invention comprises core **33** covered on both surfaces **34, 35** with a layer of ink **36** which is positioned between layers of overlamine film **38, 39**, all of which has been laminated together as described. One or more cards **10** then may be cut

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from the resulting plastic card stock and card **10** will have a thickness in the range of 0.028 inches to 0.032 inches with variation in overall thickness across the surfaces **12, 14** thereof being no greater than approximately 0.0005 inches.

5 The one or more cards **10** can thus be said to have a surface smoothness of approximately 0.0005 inches or better. Thus, a card **10** manufactured in accordance with the present invention includes at least one surface **12, 14** at preferably both surfaces **12, 14** that are sufficiently smooth and regular to receive dye sublimation printing.

Those skilled in the art will recognize that the foregoing description has set forth the preferred embodiment of the invention in particular detail and it must be understood that numerous modifications, substitutions, and changes may be undertaken without departing from the true spirit and scope of the present invention as defined by the ensuing claims.

What is claimed is:

1. A process for incorporating at least one electronic element in the manufacture of a plastic card, comprising the steps of:

- (a) providing first and second plastic core sheets;
- (b) positioning said at least one electronic element in the absence of a non-electronic carrier directly between said first and second plastic core sheets to form a core, said plastic core sheets defining a pair of inner and outer surfaces of said core;
- (c) positioning said core in a laminator apparatus, and subjecting said core to a heat and pressure cycle, said heat and pressure cycle comprising the steps of:
 - (i) heating said core for a first period of time;
 - (ii) applying a first pressure to said core for a second period of time such that said at least one electronic element is encapsulated by said core;
 - (iii) cooling said core while applying a second pressure to said core,
- (d) applying a layer of overlamine film to at least one of said outer surfaces of said core.

2. The process for incorporating at least one electronic element in the manufacture of a plastic card as recited in claim 1, wherein said laminator apparatus has first and second laminating plates, at least one of said first and second laminating plates having a matte finish for creating a textured surface on at least one of said outer surfaces of said core.

3. The process for incorporating at least one electronic element in the manufacture of a plastic card as recited in claim 2, wherein each of said first and second laminating plates has a matte finish for creating said textured surface on both of said outer surfaces of said core.

4. The process for incorporating at least one electronic element in the manufacture of a plastic card as recited in claim 1, wherein said first and second plastic core sheets are made from a material selected from the group consisting of polyvinyl chloride, polyester, and acrylonitrile-butadiene-styrene, each of said sheets having a thickness in the range of 0.007 to 0.024 inch.

5. The process for incorporating at least one electronic element in the manufacture of a plastic card as recited in claim 4, wherein said first and second plastic core sheets have a thickness of approximately 0.0125 inch.

6. The process for incorporating at least one electronic element in the manufacture of a plastic card as recited in claim 1, wherein said second pressure is greater than said first pressure.

7. The process for incorporating at least one electronic element in the manufacture of a plastic card as recited in

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claim 6, wherein said second pressure is at least approximately 25% greater than said first pressure.

8. The process for incorporating at least one electronic element in the manufacture of a plastic card as recited in claim 1, wherein said core is heated in step (c)(i) to a temperature in the range of 275° F. to 400° F. and said first period of time is at least five (5) minutes.

9. The process for incorporating at least one electronic element in the manufacture of a plastic card as recited in claim 1, wherein said first pressure is approximately 1000 p.s.i. and said second period of time is at least 10 minutes.

10. The process for incorporating at least one electronic element in the manufacture of a plastic card as recited in claim 1, wherein said step (d) of applying a layer of overlamine film comprises the further steps of:

- (a) positioning an overlamine film on at least one surface of said core;
- (b) subjecting said core to a second heat and pressure cycle comprising the steps of:
 - (i) heating said core to a temperature between approximately 175° F. to 300° F. for approximately 10 to 25 minutes;
 - (ii) applying approximately 1000 p.s.i. pressure to said core, and
 - (iii) cooling said core to a temperature in the range of approximately 40° F. to 65° F. for approximately 10 to 25 minutes.

11. The process for incorporating at least one electronic element in the manufacture of a plastic card as recited in claim 1, wherein said at least one electronic element is a micro-chip and an associated wire antenna.

12. The process for incorporating at least one electronic element in the manufacture of a plastic card as recited in

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claim 1, wherein said at least one electronic element is a micro-chip and an associated circuit board antenna.

13. The process for incorporating at least one electronic element in the manufacture of a plastic card as recited in claim 1, wherein said at least one electronic element is a read/write integrated chip and an associated antenna.

14. A plastic card constructed in accordance with claim 1.

15. A hot lamination process for the manufacture of plastic cards, said process comprising the steps of:

- (a) providing first and second plastic core sheets;
- (b) positioning at least one electronic element in the absence of a non-electronic carrier directly between said first and second plastic core sheets to form a layered core;
- (c) positioning said core in a laminator apparatus, and subjecting said core to a heat and pressure cycle, said heat and pressure cycle comprising the steps of:
 - (i) heating said core in said laminator, in the presence of a minimal first ram pressure, to a temperature which causes controlled flow of said plastic which makes up said first and second plastic core sheets;
 - (ii) applying a second pressure uniformly across said core for encapsulating said at least one electronic element within said controlled flow plastic;
 - (iii) subsequently cooling said core in conjunction with the concurrent application of a third pressure uniformly across said core, said core including and upper and lower surfaces.

16. The method as recited in claim 15 wherein said first and second core layers are devoid of any appreciable cut-outs.

* * * * *

EXHIBIT 3

Keith R. Leighton

2817 Fulmer Road
Lorain, Ohio 44053

Phone: 440-960-1697

OBJECTIVE: Printing/Technical Consultant

Trouble shoot and solve technical problems leading to superior product quality by contributing proven ability to:

- Analyze, research and correct chemical/mechanical deficiencies.
- Experiment with, invent and recommend innovative lithographic process.
- Diagnose problems, organize and supervise production improvements.
- Formulate, treat and print on difficult substrates.

QUALIFICATIONS:

A knowledgeable innovative professional offering 46 years progressive experience encompassing:

- | | | |
|---------------------------|-------------------|---------------------|
| • Plastic Cards/Novelties | • Press Mechanics | • Ink Chemistry |
| • Commercial Printing | • Laminating | • Press Chemistry |
| • Specialized Printing | • Pre-press | • Sheet/Web Presses |

Journeyman Printer for 31 years with training and experience in all phases of the lithographic trade.

ACHIEVEMENTS:

Invented Radio Frequency Identification Devices (RFID) using self developed Hot Lamination Method. One patent issued, one allowed, and two pending.

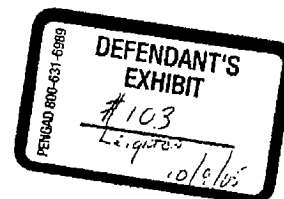
Invented process and method for printing on PVC/Unlaminated Plastic identification devices on a web press, whereby three people can achieve a per-hour production rate of 100,000 completed pieces.

Solved printing problems related to plastic financial bank cards, restoring five major customers with total annual sales in excess of 5000mm.

Managed plant turnaround by rebuilding laminator, installing pneumatic air peddle on guillotine cutter and developing wet offset method for printing on plastic cards, saving company and jobs of thirty employees.

Invented vacuum-backed plate bender, that eliminated distorted plate register and is used universally throughout web press industry

Recommended higher quality plate material, changed ink and press chemistry and completely over-hauled web press, improving quality of printing, decreasing labor costs and reducing paper waste, and saving over \$200K annually.



Keith R. Leighton

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EXPERIENCE:

Research and Development, Invented hot lamination process to manufacture various smart cards. One patent issued and one patent allowed by U.S. Patent Office. Two patents pending. 1996 – 1999

Technical Consultant, Motorola/Indala, San Jose, California
Developed a plastic Radio Frequency Identification card. 1995

Technical Consultant, Plastag, Inc., Chicago, Illinois
Developed ultra violet printing inks for ISO standard lamination process. 1995

Technical Consultant, Columbus Carton, Columbus, Ohio
Replaced ink rollers and established printing pressure for printing on a Miehle Flat Bed Letter Press. 1995

Technical Consultant, Laminex D & K, Charlotte, North Carolina and Data Code, Solon, Ohio
Developed plan to establish a plastic card manufacturing plan 1995

Technical Consultant, Rainbow Printing, Uniontown, Ohio
Developed new state-of-the-art ultra-violet printing system which increased card production and reduced operating expenses. 1991 – present

Technical Consultant/Printing Manager, Cardtech, Twinsburg, Ohio
Managed printing processes, assuring close tolerances and quality control needed for the production of VISA and MasterCard. 1990 – 1991

Pressman Foreman/Pressman, Bowne of Detroit, Detroit, Michigan
Financial/Legal printer supervising five employees. 1985 – 1990

Plant Manager, Harland Press and Mulford Printing, Warren, Michigan
Managed fifty employees in a printing, die cutting and bindery operation. 1983 – 1985

Owner/Operator, Royal Chambers, Inc., Birmingham, Michigan
Leased and maintained 24 furnished apartments. 1981 – 1983

Production Manager, CSI (formerly 2B Systems Corp.), Madison Heights, Michigan
Managed thirty employees and was responsible for total plant operations and maintenance. 1970 – 1981

Pressman/Color Proofer, General Motors Photographic, Detroit, Michigan
Printing, color proofing and production on sheet fed and web press machines. A progression for Plate Maker/Engraver. 1953 - 1970

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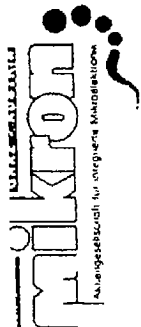
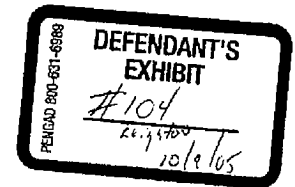
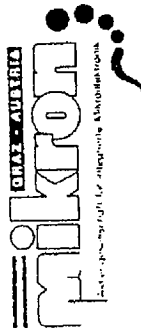
Pressman Foreman/Pressman, Bowne of Detroit, Detroit, Michigan
Financial/Legal printer supervising five employees. 1985 - 1990

Plant Manager, Harland Press and Mulford Printing, Warren, Michigan
Managed fifty employees in a printing, die cutting and bindery operation. 1983 - 1985

Owner/Operator, Royal Chambers, Inc., Birmingham, Michigan
Leased and maintained 24 furnished apartments. 1981 - 1983

Production Manager, CSI (formerly 2B Systems Corp.), Madison Heights, Michigan
Managed thirty employees and was responsible for total plant operations and maintenance. 1970 - 1981

Pressman/Color Proofer, General Motors Photographic, Detroit, Michigan
Printing, color proofing and production on sheet fed and web press machines. A progression for Plate Maker/Engraver. 1953 - 1970

**Hitag®**RFID Systems and
Contactless Smart CardsLamination Process
Patent Pending
Keith Leighton
Inventor**Mifare®**RFID Systems and
Contactless Smart CardsLamination Process
Patent Pending
Keith Leighton
InventorMotorola, Indala
Keith Leighton, Consultant
5/5/95

(617) 325-9600

(216) 960-1697

Keith Leighton
Technical Consultant
lamination process

EXHIBIT 4

1. Hire KEITH, CONSULTANT

2. Agree on Cost for up front items. \$500 →

3. KEITH GIVE WRITTEN QUOTE ON COST 2. KT REQ FOR #3

4. Agree on Cost for BENE HERE 4 wks (weekly cost)

5. KEITH GIVE WRITTEN QUOTE W/ALREADY COST GO. INCLUDE DEPENDENCIES, SUBSEQUENTIVES

6. K WRITE REQ FOR #5

#5. \$7,500/4 wks (weekly rate of \$1875/wk)

\$1,500 BENE for 4 wks, 10K CHORDS PRODUCED

\$500 for up front LIST/ISSUE. #774

APPEALMENT (W) PRINCIPLE MOTOROLA CONSULTANT RECEIVED

MUTUAL DISCLOSURES SIGNED

W/MOTOROLA ENDAURA INC. 2-17-95

KEITH LEEGATION

\$1,000/week

\$250/wk - Apt

\$120/wk → CAR

\$350/wk

\$100/wk tickets

\$450/wk

1900/wk

+ \$2,000 h. #4 wks

\$1,600.00/wk

450.00/wk

\$2050/wk

x 4 wks

\$8,200 4 wks

\$7,500 + \$1500 BONUS for 20K 1.3 2.11.95

K. THOMPSON

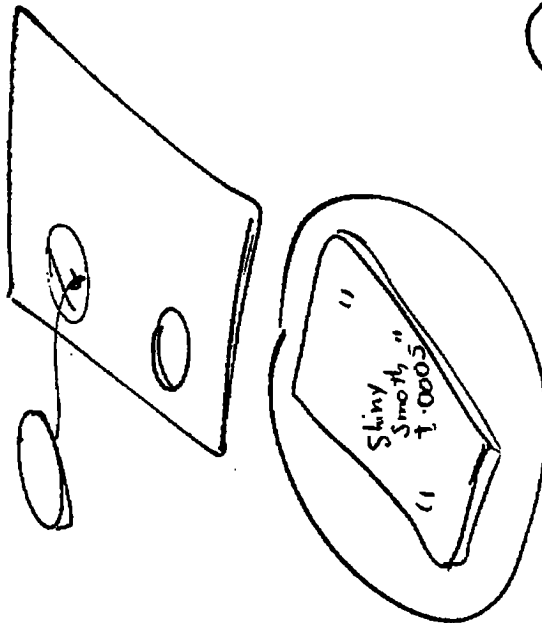
K. LEIGHTON

J-M DELBECQ

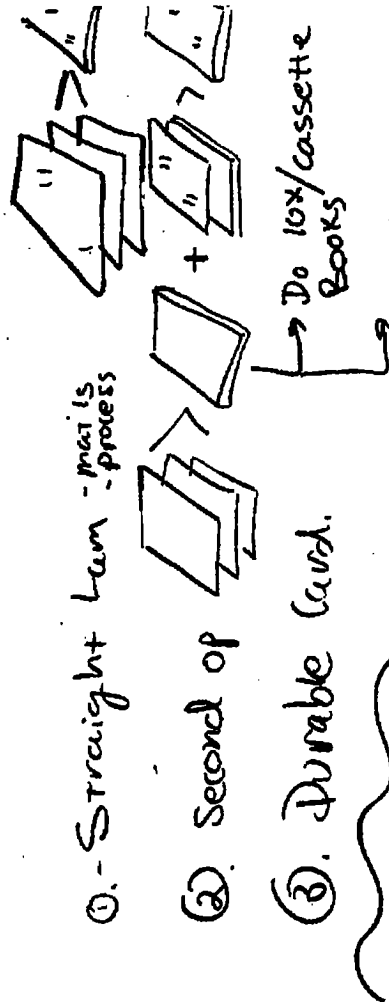
K.R. GRAFTS

J. DELLER 2/17

2-17-95 Smith Lighter



• Increase Cold side Ram
• hold longer
• do full books!



1. List of what To do first!
 2. Come here, help make 20K cards
- 1 month

S.S. Poling
Went Over

EXHIBIT 5

Motorola Indala Ken Thompson

408 383 7941

02/23/95

011:04 AM

February 22, 1995

Ken Thompson
Technical Operations Manager
Motorola Indala Corp.
3041 Orchard Parkway
San Jose, Ca. 95118
ph 408 383 4092
fax 7941

Keith Leighton
2817 Fulmer Rd.
Lorain, OH. 44053
ph 216 960 1697
wk 631 7710
fax 960 2335

Kieth,

We were pleased to meet with you on February 17th concerning potetial work in development of PVC lamination for our products. I would like to outline the results of our discussions along with the next steps.

We have confidence that you can lead our efforts in making flat, printable cards. Jean-Marc and I both were impressed with your background, material knowledge, process control applications, design of experiments, machine knowledge, and industry familiarity. We would like to hire your services in San Jose pending approval of a purchase requisition which we will submit after we have received your proposal.

Here are the steps to completing this process:

1. Keith to send to Ken Thompson a list of "up front items" required prior to your arrival. This list should include: materials needed, tooling needed, process monitoring equipment required, sources for obtaining the materials, etc. and any other items you may require once you arrive. A thorough list of quantity, type, source, cost, and delivery of materials is essential. Expected start date here in San Jose should also be included. Please estimate the material and equipment cost we will need to successfully complete this project.
2. Motorola will issue a \$500.00 purchase req for this list.
3. Keith provide Motorola (Ken Thompson) a quote for services. The quote should contain previously discussed terms:
 - \$1875/wk for 4 weeks
 - \$1500 bonus for completed process after 4 weeks which produces >10K cards prior to end of 4th week
 - deliverables (see below list of desired deliverables)
 - Motorola reserves the right for services cancellation with 1 week notice
 - signed Motorola Consultant Agreement
 - signed Non Disclosure Agreement
 - Keith's disclosures to Motorola

--- Motorola Indala Confidential and Proprietary ---

Motorola/Indala ... Ken Thompson

408 383 7941

2/23/95

11:05 AM

3/4

4. With all agreements signed, Motorola will issue purchase order to you once requisition is approved. PO will be based on your quote.

As stated before, we would like to see you start ASAP. Prior to starting, we would like to make sure all necessary items are here for you to be as effective as possible.

Regards,

Ken Thompson

cc: Jean-Marc Delbecq
Jaime Martorell
Brad Kolb
Harlan Pester

-- Deliverables Attachment Enclosed --

--- Motorola Indala Confidential and Proprietary ---

EXHIBIT 6

-- Deliverables Attachment Enclosed --

**** Deliverables ****

The items to be included in quote as basis for payment must include the following deliverables.

1. Materials
 - a. complete specification of all materials to include: thicknesses and tolerances, chemical make-up, vendor part number, sizes
 - b. incoming inspection procedure for material
 - c. handling and storage requirements for materials, conditioning if necessary
 - d. lot traceability procedure for materials
2. Process
 - a. complete processes specification for producing PVC cards at .038"±.004" with a surface flatness (1 side) of <0.0005" at less than 40 minutes per cycle
 - b. PVC lamination process to achieve flatness or combination of PVC lamination and post-process cold lamination (or gluing) of PVC top, printable layer
 - c. process to be developed with final outcome of using 4 cassette books, and 5-12 layers per book
 - d. Quality control process for documentation of lamination process on each lot with future traceability
 - e. Data compiled for flatness vs. material and process used
3. Equipment / Monitoring Equipment / Test Equipment
 - a. Procedure for lamination press operation
 - b. Static discharge equipment requirement for laminated sheets
 - c. Specifications for cassette design, mirror plate w/source, press pads, and press plates
 - d. Process monitoring tooling needed for tracking of lamination performance to lot
 - e. Specification and set-up of test equipment on laminated product
 - f. Preventive maintenance specification for lamination equipment and tooling
4. Product

-- Motorola Indala Confidential and Proprietary --

Keith Lighton
3-22-95

Motorola / Indala ... Ken Thompson

408 383 7941

3/20/95

8:28 AM

4/4

- a. Manufacture of ISO format card with embedded electronic Rf ID's to a surface flatness of 0.0005" for dye sublimation printing
- b. Production of >10,000 cards using process, tooling, and material identified within 4 weeks along with all above items to receive bonus amount of \$1,500.00

Keith Lighten
3-22-95

EXHIBIT 7

CONFIDENTIALITY AGREEMENT

In consideration of my engagement by Motorola, Inc. ("Motorola"), as a Consultant/Contractor for programs or products as directed by Motorola, and in consideration of the compensation paid to me for my services in the course of such engagement, I understand and agree to the following provisions for the protection of the property rights of Motorola:

1. I will promptly and fully communicate in writing to an Executive Officer of Motorola or its nominees, all inventions, innovations and ideas developed or conceived by me, whether solely or jointly with others at any time during the entire period of my engagement with Motorola, and which inventions, innovations and ideas relate to the actual and anticipated business activities of Motorola, or result from, or are suggested by, work which I do for Motorola. I agree to assign and hereby assign to Motorola as its exclusive property the entire right, title and interest in all such inventions, innovations and ideas. I will, at all times during my engagement with Motorola, and after the termination of my engagement for any reason, assist Motorola in every proper way but entirely at Motorola's expense, to obtain and maintain for Motorola's benefit patents, copyrights, and other legal protection in any and all countries for the above-mentioned invention, innovations, and ideas. When requested, I will execute all papers, provide proper assistance and do all things that may reasonably be required in order to protect and maintain the rights of Motorola in such inventions, innovations, and ideas. I agree that all such inventions, innovations, and ideas are and will remain the property of Motorola whether or not patented. I agree to keep, maintain and make available to Motorola, written records of all such inventions, innovations, and ideas, and to submit promptly such written records, and supplemental oral disclosures, to designated representatives of Motorola. I agree that the obligations of this paragraph 1 will be binding upon my heirs, executors and administrators, and may be transferred by Motorola.
2. That I will maintain strictly confidential and not publish, disseminate, or disclose to others, data and information of Motorola which I may originate or of which I learn during my period of engagement with Motorola and which is of a confidential or secret nature, including but not limited to product, machine, and process developments, whether patentable or not, manufacturing "know-how", formulas, designs, photographs, plans, specifications, drawings, sketches,

schematics, parts lists, computer software, cost and pricing practices, customer lists, records of customer requirements and usages, personnel records, company financial records, and the like. I will only use such data and information as required in and for the performance of work for Motorola. I acknowledge that my obligation not to use, publish or otherwise disclose such data and information of Motorola to others continues after termination of my engagement with Motorola. Upon termination of my period of engagement with Motorola for any reason whatsoever, I will not take with me or remove documentary material of Motorola on such data and information, or any record or copy thereof in whole or part.

3. The obligations in paragraph 2 do not apply to any such data or information which is, or becomes, publicly available otherwise than through breach of this Agreement. I agree that during my period of engagement with Motorola I may originate or learn of such data and information through visual, oral, or documentary means. I agree that the obligations in these paragraphs 2 and 3 are fair and reasonable, and are essential for the protection of the property rights of Motorola. With respect to any such data and information which is in a physical or documentary form, I agree that the obligations in these paragraphs 2 and 3 are binding upon my heirs, executors, and administrators, and may be transferred by Motorola. This Agreement replaces any existing agreement between Motorola and me regarding patents and/or confidential information and may not be modified except in writing with approval of an Executive Officer of Motorola or its nominees.

Keith R. Leighton
CONSULTANT SIGNATURE
KEITH R. LEIGHTON
PRINTED NAME
2-23-95
DATE

MOTOROLA WITNESS SIGNATURE

PRINTED NAME

DATE

EXHIBIT 8



MOTOROLA
Indala Corporation

3041 ORCHARD PARKWAY • SAN JOSE, CA 95134-2017 • 408-383-4000 • FAX 408-434-7029

SHIP TO

MOTOROLA

INDALA CORPORATION
3041 ORCHARD PARKWAY
SAN JOSE, CA 95134

PAGE 1

PURCHASE ORDER NO. S950747
CHANGE ORDER

VENDOR KEITH LEIGHTON

2817 FULMER ROAD
LORAIN
OH
44053

BILL TO

MOTOROLA
INDALA CORPORATION
3041 ORCHARD PARKWAY
SAN JOSE, CA 95134

TX: 408-434-7010
408-434-7010

Purchase Order

RESALE #

TX: 408-434-7029
408-434-7010

TELEX 216-960-2335
PHONE 216-960-1697

ORDER DATE	VENDOR CODE	TERMS	SHIP VIA	BEST METHOD	CONFIRM TO						
03/02/95	1439	NET 30			KEITH LEIGHTON						
TO ORDER DESTINATION	TAXABLE	PO TYPE	BUYER	REQUESTOR	DELIVER TO						
	YES	SEV	HW	KEN THOMPSON	KEN THOMPSON						
ITEM	PART NUMBER DESCRIPTION			REV	INSP	DELIVERY DATE	QUANTITY	UOM	UNIT PRICE	EXTENSION	TA

CONSULTANT SERVICES TO BE PERFORMED PER TERMS OF AGREEMENT
DATED 02/22/95 ATTACHED AND MADE PART OF THIS P.O.

1.00 MISC001-S950747
ACCOUNT: 01-553-1090
UP FRONT ITEM LIST

QTY ORDERED: 1.00 QTY RECEIVED: .00 QTY DUE: .00

2.00 MISC002-S950747
ACCOUNT: 01-553-1090
FOUR WEEKS OF CONSULTANT WORK

QTY ORDERED: 4.00 QTY RECEIVED: .00 QTY DUE: .00

3.00 MISC003-S950747
ACCOUNT: 01-553-1090
BONUS UPON MEETING TERMS OF AGREEMENT DATED 02/22/95.

QTY ORDERED: 1.00 QTY RECEIVED: .00 QTY DUE: .00

SIGNED CONFIDENTIALITY AGREEMENT AND D.O.D. RECEIVED AND
ATTACHED AS PART OF THIS P.O. PAYMENT AUTHORIZED BY KEN
THOMPSON. PRICES SHOWN INCLUDE TIME AND MATERIALS

AGENT

G. H. 3/3/95

VENDOR

TOTAL ORDER

THE TERMS AND CONDITIONS SET FORTH ON THIS ATTACHMENT SUPERSEDE ALL TERMS AND CONDITIONS LOCATED ON THE REVERSE SIDE OF THE PURCHASE ORDER TO WHICH THESE TERMS AND CONDITIONS ARE ATTACHED.

1. **ACCEPTANCE-AGREEMENT.** Seller's commencement of work or shipment of the goods, whichever occurs first, shall constitute acceptance of this purchase order and all of its terms and conditions. Motorola hereby objects to any terms proposed in Seller's acceptance or acknowledgement of Motorola's offer which add to, vary from, or conflict with the terms of this order. Any such proposed terms shall not operate as a rejection of this offer but shall be deemed a material alteration; and this offer shall be deemed accepted by the Seller without said additional different terms. If this purchase order shall be deemed an acceptance of a prior offer by Seller, such acceptance is expressly limited to the terms contained on the front and back of this order. Motorola hereby objects to any additional or different terms contained on Seller's acceptance, acknowledgement, or any other form and any attempt by Seller to vary, in any degree, any of the terms of this purchase order shall be deemed a material alteration.
 2. **PRICE.** The articles shipped or work performed against this order must not be invoiced at a higher price than shown without written consent. The invoice must itemize transportation charges and taxes separately, if applicable. If the price is omitted from the order, the price shall be the lowest prevailing market price. No charge will be allowed for packing, labeling, custom duties, storage, crating, or express handling unless indicated on the order.
 3. **PROPRIETARY INFORMATION-CONFIDENTIALITY.** Any information or data in the form of specifications, drawings, reprints, technical information or otherwise furnished by the Seller under this order shall remain Motorola's property, shall be deemed proprietary, and shall be promptly returned at Motorola's request. Seller shall not disclose, without Motorola's written permission, any such information or data to any other person, or use such information or data itself for any purpose other than performing this order. The obligations under this paragraph will survive the cancellation, termination or completion of this order. Unless otherwise agreed in writing, no commercial, financial or technical information disclosed in any manner or at any time by Seller to Motorola shall be deemed secret or confidential.
 4. **WARRANTIES.** Seller expressly warrants that all goods or services provided under this order shall be merchantable, free from defects in material and workmanship, of the highest quality, and shall conform to all applicable specifications and appropriate standards. If Seller knows of any reason to know the particular purpose for which Motorola intends to use the goods or services, Seller warrants that such goods or services shall be fit for such particular purpose. Seller further warrants that it has good warrantable title to the goods. Seller shall indemnify and hold Motorola harmless for all damages arising out of any breach of these warranties. Seller shall extend all warranties it receives from its vendors to Motorola, and to Motorola's customers. Breach of these warranties, or any other term of this order, shall entitle Motorola to all available remedies, including those of the Uniform Commercial Code.
 5. **TERMINATION.** Motorola may terminate all or any part of this order at any time for its convenience upon written notice to Seller. Motorola will pay a reasonable termination charge based on a percentage of the order price reflecting the percentage of work performed by Seller prior to termination. Motorola may also terminate this order, in whole or in part, for cause if Seller defaults. Any claim for payment of such termination charges must be submitted in writing to Motorola within thirty (30) days of receipt of written notice of termination, thoroughly documented by invoices or other applicable documents. Motorola shall have the right to audit all elements of any termination claim, and Seller shall make available to Motorola on request all books, records and papers relating thereto. The provisions of this paragraph are without prejudice to the rights of Motorola in the event of any failure on the part of Seller to comply with the performance schedule or other provisions of this order. Late deliveries, deliveries of products which are defective or which do not conform to this order, and failure to provide reasonable assurances of future performance upon request, shall all be reasons allowing Motorola to terminate this order for cause. In such event, Motorola shall not be liable to Seller for any amounts, and Seller shall be liable for any damages due to Seller's breach or default. If it should be determined that Motorola has improperly terminated this order for default, such termination shall be deemed to be for Motorola's convenience. Neither party will be liable to the other for any delay or failure to perform if that delay or failure results from a cause beyond its reasonable control, except that Motorola may terminate all or any portion of this order without liability to Seller or if such delay or failure to perform by Seller or on the part of Seller extends beyond thirty (30) days of Motorola's requested delivery date.
 6. **PATENT INDEMNITY.** By acceptance of this order, Seller agrees to indemnify Motorola against all claims, judgments, decrees, costs and expenses, and attorney's fees incident to any proceeding which may be brought against Motorola or its agents, distributors, customers, or other vendors based on a claim of alleged copyright, maskwork right, patent, infringement, as well as for an alleged claim of unfair competition resulting from similarity in design, trademark or appearance of goods or services furnished under this order, unless the goods or services are of Motorola design or formula, and Seller agrees that it will, upon request of Motorola and at Seller's own expense, defend or assist in the defense of any action which may be brought against Motorola or its agents, distributors, customers, or other vendors for such infringement or claimed infringement or alleged claim of unfair competition. Motorola agrees to notify Seller promptly upon receipt of notice of infringement or information of such a suit having been filed.
 7. **MATERIALS, TOOLS AND EQUIPMENT.** All tools, equipment, dies, gauges, models, drawings or other materials paid for or furnished by Motorola for the purpose of this order shall be and remain the sole property of Motorola. Seller shall safeguard all such property while it is in Seller's custody or control; be liable for any loss of damage to such property; use it only for Motorola orders; and return it to Motorola upon request. Such property may be removed from Seller's premises by Motorola without extra cost.
 8. **INDEMNIFICATION.** Seller shall defend, indemnify and hold Motorola harmless against all damages, claims or liabilities and expenses (including attorney's fees) arising out of or resulting in any way from any patent or latent defect in the goods or services purchased under this order, or from any act or omission of seller, its agents, employees or subcontractors. This indemnification shall be in addition to the warranty obligations of seller.
 9. **CHANGES.** Motorola shall have the right to make changes in this order at any time for its convenience upon written notice to Seller. Such changes shall be subject to an equitable adjustment in the performance schedule or purchase price, based on reasonable and unavoidable costs incurred by the Seller prior to notice of the change. Any claim of Seller for an adjustment must be submitted in writing to Motorola within thirty (30) days of the Motorola change notice.
 10. **INSPECTION.** Seller's facilities, equipment, goods and services purchased under this order are subject to Motorola's inspection and acceptance. Payment for the goods and services delivered shall not constitute acceptance. Goods shall only be deemed accepted when they have actually been counted, inspected, and tested by Motorola and found to be in conformance with this order. Goods rejected and/or goods supplied in excess of the delivery schedule may, in addition to Motorola's other rights, be returned to Seller at its expense, including all expenses of unpacking, examining, repacking and reshipping such goods. If Motorola receives goods or services whose defects or nonconformities are not apparent on examination, Motorola reserves the right to require replacement, as well as transportation costs and payment of damages. Nothing contained in this purchase order shall relieve Seller from the obligations of testing, inspection and quality control.
 11. **PACKING, DELIVERY AND SHIPMENT.** All delivered goods shall be packed and shipped in accordance with instructions or specifications on this order. In the absence of any such instructions, Seller shall comply with best commercial practice to ensure safe arrival at destination at the lowest transportation cost. **TIME IS OF THE ESSENCE ON THIS ORDER.** If goods are not delivered or services provided by the date specified, Motorola may terminate this order as to items not yet shipped or services not yet rendered without liability, by notice effective upon receipt by Seller. In such instance, Motorola may purchase substitute items or services elsewhere and charge Seller with any loss incurred. If in order to comply with Motorola's required delivery date it becomes necessary for Seller to ship by a more expensive method than specified in this purchase order, Seller shall pay any increased transportation costs, unless the necessity for such repurposing or expedited handling has been caused by Motorola.
 12. **MATERIAL SAFETY DATA SHEETS.** All chemicals purchased under the terms and conditions of this order shall be accompanied with a Material Safety Data Sheet provided by the chemical supplier/manufacturer. All chemical suppliers certify by acceptance of this order that the chemicals purchased are on the Toxic Substances Control Act, 15 U.S.C.S. §2601, et. seq., chemical inventory or are subject to an exemption and that such exemption is specified in the Material Safety Data Sheet.
 13. **OZONE DEPLETING SUBSTANCES.** The manufacturer/supplier of any material purchased under this order is certifying by acceptance of this order that either the material is not manufactured with any substance that harms public health and environment by destroying ozone in the upper atmosphere or if the material was manufactured with ozone destroying substances the manufacturer/supplier certifies that the material is labeled according to the Clean Air Act Amendments of 1990 Public Law 101-549 §511(d)(2) or any alternative labeling that the Environmental Protection Agency has determined acceptable.
 14. **INSURANCE.** If this order includes services or work to be performed on Motorola's premises, seller agrees to indemnify Motorola from all loss or damage arising out of such work, to observe the highest safety standards, to adhere to all Motorola work rules and security requirements, to maintain insurance satisfactory to Motorola, and to furnish evidence of such insurance at Motorola's request.
 15. **COMPLIANCE WITH LAWS.** Seller warrants that all goods and services supplied pursuant to this order will have been produced in compliance with all applicable federal, state and local laws, orders, rules and regulations. Seller shall indemnify Motorola against any liability on account of any non-compliance.
 16. **IMPORT/CUSTOMS.** For each shipment where the Seller sources goods covered by this order outside the United States Customs Territory, Motorola shall have the option of being the Importer of Record. In such case, the Seller shall furnish Motorola with a commercial invoice and the price specified on the face of this order shall be fully stated on the commercial invoice and shall include all elements of the amount paid or payable by Motorola. The value of all items deemed "assists", as defined in 19 C.F.R. §152.102, for the purposes of this order shall be declared on the commercial invoice for the first shipment of said goods destined for the United States Customs Territory.
- In accordance with paragraph 15 (COMPLIANCE WITH LAWS) above, Motorola holds the Seller responsible for compliance with all applicable Federal Regulations, including but not limited to those related to Country of Origin Marking (19 C.F.R. §134). Motorola further reserves the right to claim duty drawback and, the Seller, upon request, shall furnish Motorola with all pertinent documents and shall identify the country of origin of all goods covered hereunder.
17. **GOVERNMENT SUBCONTRACT.** If a government contract number appears on the face of this order, Seller agrees to comply with all terms and conditions of that government contract which appear on Exhibit A attached hereto and made a part hereof and any other pertinent laws, Presidential directives and executive orders to the extent that they apply to the subject matter of this order.
 18. **EQUAL EMPLOYMENT OPPORTUNITY AND AFFIRMATIVE ACTION.** This order incorporates by reference: (a) all provisions of 41 C.F.R. 60-1.4 and 60-2 as implemented by Federal Acquisition Regulation (FAR) 52.222-26(b)(1)-(11) pertaining to the Equal Opportunity clause; (b) all provisions of 41 C.F.R. 60-250 as implemented by FAR 52.222-35 and -37 pertaining to employment reports and affirmative action for disabled veterans and veterans of the Vietnam Era; and (c) all provisions of 41 C.F.R. 60-741 as implemented by FAR 52.222-36 pertaining to affirmative action for handicapped/disabled workers.
- Seller agrees to comply with any and all applicable State and Local Government Equal Employment Opportunity and Affirmative Action laws, including any and all applicable statutes, rules, regulations, ordinances and other guidelines.
19. **EEQ-1 REPRESENTATION.** Seller represents that it has submitted Standard Form 100 (EEO-1) compliance reports as required by 41 C.F.R. 60-1.7 as implemented by FAR 52.222-22.
 20. **CERTIFICATION OF NONSEGREGATED FACILITIES.** Seller certifies that, in compliance with 41 C.F.R. 60-1.8 as implemented by FAR 52.222-21, it does not and will not maintain or provide for its employees any segregated facilities at any of its establishments, and that it does not and will not permit its employees to perform their services at any location under its control where segregated facilities are maintained. Seller agrees that breach of this certification is a violation of the Equal Opportunity clause incorporated herein. Seller further agrees that it will either: (a) obtain certifications of nonsegregated facilities from proposed subcontractors for specific time periods; or (b) obtain certifications of nonsegregated facilities from proposed subcontractors before the award of any subcontracts subject to the Equal Opportunity clause, will retain such certifications in its files, and forward the Notice set forth in FAR 52.222-21 to proposed subcontractors.
 21. **DISPUTE RESOLUTION.** Both parties agree that any claims or disputes will be submitted to non-binding mediation prior to initiation of any formal legal process. Costs of mediation will be shared equally. This provision does not apply to claims or disputes relating to intellectual property rights.
 22. **GENERAL.** This purchase order and any documents attached to or referred to on this order constitute the entire agreement between the parties and can only be modified in writing signed by authorized representatives of both parties. No part of this order may be assigned or subcontracted without the prior written approval of Motorola. All claims for money due or to become due from Motorola shall be subject to deduction or set off by Motorola for any counterclaim arising out of this or any other transaction with Seller. Motorola's total liability for damages under this order shall not exceed the price allocable to the goods or services giving rise to the claim. Motorola's failure to enforce or insist on performance of any of the terms or conditions in this order shall not operate as a waiver of that or any other right. This order shall be governed by the laws of the state of Illinois.

TAX. REG. NUMBERS

ILLINOIS 0239-2623
FLORIDA 78-11-015510-63

TEXAS 3-00018-8018-3
NEW MEXICO 01-760351-000

ARIZONA 07-041258-P
PENNSYLVANIA 98-193272

IOWA 2-00-110540
PUERTO RICO 1296-SL-1846

REVISED - SEPT. 1992

PAGE 2
PURCHASE ORDER NO. 5950747
CHANGE ORDER

MOTOROLA
INDALA CORPORATION
3041 ORCHARD PARKWAY
SAN JOSE, CA 95134

SHIP TO

MOTOROLA
Indala Corporation

3041 ORCHARD PARKWAY • SAN JOSE, CA 95134-2017 • 408-383-4000 • FAX 408-434-7029

Purchase Order

TX: 408-434-7029
408-434-7010

VENDOR KEITH LEIGHTON

2817 FULMER ROAD
LORAIN
OH
44053

BILL TO
MOTOROLA
INDALA CORPORATION
3041 ORCHARD PARKWAY
SAN JOSE, CA 95134

RESALE #

TX: 408-434-7029
408-434-7010

TELEPHONE 216-960-2335
216-960-1697

ORDER DATE 03/02/95	VENDOR CODE 1439	TERMS NET 30	SHIP VIA BEST METHOD	CONFIRM TO KEITH LEIGHTON						
DESTINATION YES	TAXABLE YES	PO TYPE REV	REQUESTOR KEN THOMPSON	DELIVER TO KEN THOMPSON						
PART NUMBER DESCRIPTION			REV	INSP	DELIVERY DATE	QUANTITY	UOM	UNIT PRICE	EXTENSION	TA

FREIGHT: PREPAY & BILL

DELIVERY DATE INDICATES LATEST ANTICIPATED RECEIPT DATE.

CONFIRMING ORDER; DO NOT DUPLICATE.
ITEMS ARE NOT FOR RESALE.

AGENT *W. G. Gaudin* 3/3/95 VENDOR TOTAL ORDER 9500.00

THE TERMS AND CONDITIONS SET FORTH ON THIS ATTACHMENT SUPERSEDE ALL TERMS AND CONDITIONS LOCATED ON THE REVERSE SIDE OF THE PURCHASE ORDER TO WHICH THESE TERMS AND CONDITIONS ARE ATTACHED.

1. **ACCEPTANCE-AGREEMENT.** Seller's commencement of work or shipment of the goods, whichever occurs first, shall constitute acceptance of this purchase order and all of its terms and conditions. Motorola hereby objects to any terms proposed in Seller's acceptance or acknowledgement of Motorola's offer which add to, vary from, or conflict with the terms of this order. Any such proposed terms shall not operate as a rejection of this offer but shall be deemed a material alteration and this offer shall be deemed accepted by the Seller without said additional or different terms. If this purchase order shall be deemed an acceptance of a prior offer by Seller, such acceptance is expressly limited to the terms contained on the front and back of this order. Motorola hereby objects to any additional or different terms contained on Seller's acceptance, acknowledgement, or any other form, and any attempt by Seller to vary, in any degree, any of the terms of this purchase order shall be deemed a material alteration.
 2. **PRICE.** The articles shipped or work performed against this order must not be invoiced at a higher price than shown without written consent. The invoice must itemize transportation charges and taxes separately, if applicable. If the price is omitted from the order, the price shall be the lowest prevailing market price. No charge will be allowed for packing, labeling, custom duties, storage, crating, or express handling unless indicated on the order.
 3. **PROPRIETARY INFORMATION-CONFIDENTIALITY.** Any information or data in the form of specifications, drawings, reprints, technical information or otherwise furnished the Seller under this order shall remain Motorola's property, shall be deemed proprietary, shall be kept confidential, and shall be promptly returned at Motorola's request. Seller shall not disclose, without Motorola's written permission, any such information or data to any other person, or use such information or data itself for any purpose other than performing this order. The obligations under this paragraph will survive the cancellation, termination or completion of this order. Unless otherwise agreed in writing, no commercial, financial or technical information disclosed in any manner or at any time by Seller to Motorola shall be deemed secret or confidential.
 4. **WARRANTIES.** Seller expressly warrants that all goods or services provided under this order shall be merchantable, free from defects in material and workmanship, of the highest quality, and shall conform to all applicable specifications and appropriate standards. If Seller knows or has reason to know the particular purpose for which Motorola intends to use the goods or services, Seller warrants that such goods or services shall be fit for such particular purpose. Seller further warrants that it has good warrantable title to the goods. Seller shall indemnify and hold Motorola harmless for all damages arising out of any breach of these warranties. Seller shall extend all warranties it receives from its vendors to Motorola, and to Motorola's customers. Breach of these warranties, or any other term of this order, shall entitle Motorola to all available remedies, including those of the Uniform Commercial Code.
 5. **TERMINATION.** Motorola may terminate all or any part of this order at any time for its convenience upon written notice to Seller. Motorola will pay a reasonable termination charge based on a percentage of the order price reflecting the percentage of work performed by Seller prior to termination. Motorola may also terminate this order, in whole or in part, for cause if Seller defaults. Any claim for payment of such termination charges must be submitted in writing to Motorola within thirty (30) days of receipt of written notice of termination, thoroughly documented by invoices, or other applicable documents. Motorola shall have the right to audit all elements of any termination claim, and Seller shall make available to Motorola on request all books, records and papers relating thereto. The provisions of this paragraph are without prejudice to the rights of Motorola in the event of any failure on the part of Seller to comply with the performance schedule or other provisions of this order. Late deliveries, deliveries of products which are defective or which do not conform to this order, and failure to provide reasonable assurances of future performance upon request, shall all be reasons allowing Motorola to terminate this order for cause. In such event, Motorola shall not be liable to Seller for any amounts, and Seller shall be liable for any damages due to Seller's breach or default. If it should be determined that Motorola has improperly terminated this order for default, such termination shall be deemed to be for Motorola's convenience. Neither party will be liable to the other for any delay or failure to perform if that delay or failure results from a cause beyond its reasonable control, except that Motorola may terminate all or any portion of this order without liability to Seller or if such delay or failure to perform by Seller or on the part of Seller extends beyond thirty (30) days of Motorola's requested delivery date.
 6. **PATENT INDEMNITY.** By acceptance of this order, Seller agrees to indemnify Motorola against all claims, judgments, decrees, costs and expenses, and attorney's fees incident to any proceeding which may be brought against Motorola or its agents, distributors, customers, or other vendors based on a claim of alleged copyright, maskwork right, or patent infringement, as well as for an alleged claim of unfair competition resulting from similarity in design, trademark or appearance of goods or services furnished under this order, unless the goods or services are of Motorola design or formula, and Seller agrees that it will, upon request of Motorola and at Seller's own expense, defend or assist in the defense of any action which may be brought against Motorola or its agents, distributors, customers, or other vendors for such infringement or claimed infringement or alleged claim of unfair competition. Motorola agrees to notify Seller promptly upon receipt of notice of infringement or information of such a suit having been filed.
 7. **MATERIALS, TOOLS AND EQUIPMENT.** All tools, equipment, dies, gauges, models, drawings or other materials paid for or furnished by Motorola for the purpose of this order shall be and remain the sole property of Motorola. Seller shall safeguard all such property while it is in Seller's custody or control, be liable for any loss or damage to such property, use it only for Motorola orders, and return it to Motorola upon request. Such property may be removed from Seller's premises by Motorola without extra cost.
 8. **INDEMNIFICATION.** Seller shall defend, indemnify and hold Motorola harmless against all damages, claims or liabilities and expenses (including attorney's fees) arising out of or resulting in any way from any patent or latent defect in the goods or services purchased under this order, or from any act or omission of seller, its agents, employees or subcontractors. This indemnification shall be in addition to the warranty obligations of seller.
 9. **CHANGES.** Motorola shall have the right to make changes in this order at any time for its convenience upon written notice to Seller. Such changes shall be subject to an equitable adjustment in the performance schedule or purchase price, based on reasonable and unavoidable costs incurred by the Seller prior to notice of the change. Any claim of Seller for an adjustment must be submitted in writing to Motorola within thirty (30) days of the Motorola change notice.
 10. **INSPECTION.** Seller's facilities, equipment, goods and services purchased under this order are subject to Motorola's inspection and acceptance. Payment for the goods and services delivered shall not constitute acceptance. Goods shall only be deemed accepted when they have actually been counted, inspected, and tested by Motorola and found to be in conformance with this order. Goods rejected and/or goods supplied in excess of the delivery schedule may, in addition to Motorola's other rights, be returned to Seller at its expense, including all expenses of unpacking, examining, repacking and reshipping such goods. If Motorola receives goods or services whose defects or nonconformities are not apparent on examination, Motorola reserves the right to require replacement as well as transportation costs and payment of damages. Nothing contained in this purchase order shall relieve Seller from the obligations of testing, inspection and quality control.
 11. **PACKING, DELIVERY AND SHIPMENT.** All delivered goods shall be packed and shipped in accordance with instructions or specifications on this order. In the absence of any such instructions, Seller shall comply with the commercial practice to ensure safe arrival at destination at the lowest transportation cost. **TIME IS OF THE ESSENCE ON THIS ORDER.** If goods are not delivered or services provided by the date specified, Motorola may terminate this order as to items not yet shipped or services not yet rendered without liability, by notice effective upon receipt by Seller. In such instance, Motorola may purchase substitute items or services elsewhere and charge Seller with any loss incurred. If in order to comply with Motorola's required delivery date it becomes necessary for Seller to ship by a more expensive method than specified in this purchase order, Seller shall pay any increased transportation costs, unless the necessity for such rerouting or expedited handling has been caused by Motorola.
 12. **MATERIAL SAFETY DATA SHEETS.** All chemicals purchased under the terms and conditions of this order shall be accompanied with a Material Safety Data Sheet provided by the chemical supplier/manufacturer. All chemical suppliers certify by acceptance of this order that the chemicals purchased are on the Toxic Substances Control Act, 15 U.S.C.S. §2601, et. seq., chemical inventory or are subject to an exemption and that such exemption is specified in the Material Safety Data Sheet.
 13. **OZONE DEPLETING SUBSTANCES.** The manufacturer/supplier of any material purchased under this order is certifying by acceptance of this order that either the material is not manufactured using a substance that harms public health and environment by destroying ozone in the upper atmosphere or if the material was manufactured with ozone destroying substances the manufacturer/supplier certifies that the material is labeled according to the Clean Air Act Amendments of 1990 Public Law 101-545 §81(d)(2) or any alternative labeling that the Environmental Protection Agency has determined acceptable.
 14. **INSURANCE.** If this order includes services or work to be performed on Motorola's premises, seller agrees to indemnify Motorola from all loss or damage arising out of such work, to observe the highest safety standards, to adhere to all Motorola work rules and security requirements, to maintain insurance satisfactory to Motorola, and to furnish evidence of such insurance at Motorola's request.
 15. **COMPLIANCE WITH LAWS.** Seller warrants that all goods and services supplied pursuant to this order will have been produced in compliance with all applicable federal, state and local laws, orders, rules and regulations. Seller shall indemnify Motorola against any liability on account of any non-compliance.
 16. **IMPORT/CUSTOMS.** For each shipment where the Seller sources goods covered by this order outside the United States Customs Territory, Motorola shall have the option of being the Importer of Record. In such case, the Seller shall furnish Motorola with a commercial invoice and the price specified on the face of this order shall be fully stated on the commercial invoice and shall include all elements of the amount paid or payable by Motorola. The value of all items deemed "assets", as defined in 19 C.F.R. §152.102, for the purposes of this order shall be declared on the commercial invoice for the first shipment of said goods destined for the United States Customs Territory.
- In accordance with paragraph 15 (COMPLIANCE WITH LAWS) above, Motorola holds the Seller responsible for compliance with all applicable Federal Regulations, including but not limited to those related to Country of Origin Marking (19 C.F.R. §1343). Motorola further reserves the right to claim duty drawback and, the Seller, upon request, shall furnish Motorola with all pertinent documents and shall identify the country of origin of all goods covered hereunder.
17. **GOVERNMENT SUBCONTRACT.** If a government contract number appears on the face of this order, Seller agrees to comply with all terms and conditions of that government contract which appear on Exhibit A attached hereto and made a part hereof and any other pertinent laws, Presidential directives and executive orders to the extent that they apply to the subject matter of this order.
 18. **EQUAL EMPLOYMENT OPPORTUNITY AND AFFIRMATIVE ACTION:** This order incorporates by reference: (a) all provisions of 41 C.F.R. 60-1.4 and 60-2 as implemented by Federal Acquisition Regulation (FAR) 52.222-26(b)(1)-(11) pertaining to the Equal Opportunity clause; (b) all provisions of 41 C.F.R. 60-250 as implemented by FAR 52.222-35 and -37 pertaining to employment reports and affirmative action for disabled veterans and veterans of the Vietnam Era; and (c) all provisions of 41 C.F.R. 60-741 as implemented by FAR 52.222-36 pertaining to affirmative action for handicapped/disabled workers.
- Seller agrees to comply with any and all applicable State and Local Government Equal Employment Opportunity and Affirmative Action laws, including any and all applicable statutes, rules, regulations, ordinances and other guidelines.
19. **EEO-1 REPRESENTATION.** Seller represents that it has submitted Standard Form 100 (EEO-1) compliance reports as required by 41 C.F.R. 60-1.7 as implemented by FAR 52.222-22.
 20. **CERTIFICATION OF NONSEGREGATED FACILITIES.** Seller certifies that, in compliance with 41 C.F.R. 60-1.8 as implemented by FAR 52.222-21, it does not and will not maintain or provide for its employees any segregated facilities at any of its establishments, and that it does not and will not permit its employees to perform their services at any location under its control where segregated facilities are maintained. Seller agrees that breach of this certification is a violation of the Equal Opportunity clause incorporated herein. Seller further agrees that it will either: (a) obtain certifications of nonsegregated facilities from proposed subcontractors for specific time periods; or (b) obtain certifications of nonsegregated facilities from proposed subcontractors before the award of any subcontracts subject to the Equal Opportunity clause, will retain such certifications in its files, and forward the Notice set forth in FAR 52.222-21 to proposed subcontractors.
 21. **DISPUTE RESOLUTION.** Both parties agree that any claims or disputes will be submitted to non-binding mediation prior to initiation of any formal legal process. Costs of mediation will be shared equally. This provision does not apply to claims or disputes relating to intellectual property rights.
 22. **GENERAL.** This purchase order and any documents attached to or referred to on this order constitute the entire agreement between the parties and can only be modified in writing signed by authorized representatives of both parties. No part of this order may be assigned or subcontracted without the prior written approval of Motorola. All claims for money due to or become due from Motorola shall be subject to deduction or set off by Motorola for any counterclaim arising out of this or any other transaction with Seller. Motorola's total liability for damages under this order shall not exceed the price allocable to the goods or services giving rise to the claim. Motorola's failure to enforce or insist on performance of any of the terms or conditions in this order shall not operate as a waiver of that or any other right. This order shall be governed by the laws of the state of Illinois.

TAX. REG. NUMBERS

ILLINOIS 0239-2623
FLORIDA 78-11-015510-63

TEXAS 3-00018-8018-3
NEW MEXICO 01-760351-000

ARIZONA 07-041256-P
PENNSYLVANIA 99-193272

IOWA 2-00-110540
PUERTO RICO 1296-SL-1846

REVISED --, SEPT. 1992

EXHIBIT 9

Keith Leighton
2817 Fulmer Rd
Lorain, OH 44053

Phone: 216-960-1697
Work No: 216-631-7710
Fax No. 216-960-2335

March 20, 1995

Ken Thompson
Technical Operation Manager
3041 Orchard Parkway
San Jose, CA 95118

Phone: 408-383-4092
Fax: 7941

Ken:

My Objective as your consultant is to develop a flat printable surface on a plastic identification card containing a radio receiving device by using my proven ability to:

- * Analyze, research and correct chemical/mechanical deficiencies
- * Diagnose problems, organize and supervise production improvements

To accomplish our goal to develop a flat printable surface on a plastic identification card containing a radio receiving device we will need:

1. Recording method to log data for each cycle of lamination keeping track of time cycle, heat, pressure of the ram on each opening containing books of plastic sheets. This would involve installing thermocouples in each platen on both the hot side and cold side of the laminator.

A computer to hold information - i.e. the job number, the thickness of the card, number of sheets used to make up the card, core stock, overlay core and overlamine film (coated and uncoated)

The installation of thermocouples and documentation will be handled by Motorola as per Ken Thompson.

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2. Plastic Sheets - The PVC for 7 Mil, 20 Mil, 26 Mil tin base. Also, overlaminate film coated and uncoated tin base will be ordered. The sheets will be cut to size 322 X 541 millimeter.

SUPPLIER: ARLINGTON MILLS, INC.
1430 E. Davis Street
Arlington Heights, IL 60005

Sales: Jim Ruttkay of John Ruttkay Associates
Phone: 513-984-1818

3. Dyne pens - The pens will be ordered to keep track of surface tension of the core stock.

SUPPLIER: LOTAR ENTERPRIZES
2724-2726 Finger
Green Bay, WI 54302

Phone: 414-465-6678

4. Matt and polished laminating plates to do testing

SUPPLIER: LEHIGH VALLEY POLISHERS
P.O. Box 111
Catasauqua, PA 18032

Phone: 610-266-9636

5. Laminating Pads

SUPPLIER: SANKO SALES COMPANY, INC.
6590 Jamelia Ct
Fairview, PA 16415

Phone: 814-474-1517

6. Static Eliminators

SUPPLIER: HERBERT PRODUCTS INC.
180 Linden Avenue,
P.O. Box 384
Westbury, New York 11590-0384

Phone: 516-334-6500

7. Overlamine Film (coated and uncoated)

SUPPLIER: PVC TECH
California

Sales: Clair Eitel

Phone: 213-898-3785

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The time needed to develop a flat printable surface on a plastic identification card containing a radio receiving device will be thirty days, or less, as originally agreed on your fax to me dated 2-17-95, at a total of \$9,500 (including \$500 for this list and \$1,500 bonus) paid to consultant Keith Leighton.

The tentative starting time: March 27, 1995

A handwritten signature in black ink, reading "Keith Leighton". The signature is written in a cursive, flowing style with a large initial "K".

Keith Leighton

EXHIBIT 10

Keith Leighton
2817 Fulmer
Lorain, OH 44053

May 19, 1995

MOTOROLA INDALA CORPORATION
3041 Orchard Parkway
San Jose, CA 94134-2017

ATTENTION: KEN THOMPSON

Dear Ken:

It was a pleasure working at Motorola Indala to promote the manufacture of the ISO format card with embedded electronic RFID's to a surface flatness of 0.0005" for dye sublimation printing.

The production of 10,000 cards was delayed one week because of the following reasons:

- * After I perfected the process on the small coil, you requested me to do the same on a large coil, which was not originally agreed to.
- * You did not have the large coils available for me to test, which slowed testing time.
- * The laminator had deficiencies which caused break-downs, slowing testing time and spoiling work in process.
- * Laminating plates requested my first week at Motorola were not ordered until the end of my third week at Motorola, which slowed testing.
- * You requested me to produce 10,000 coils, but the coils were not available to produce.

If the above problems, which were no fault of mine, had not been encountered, the production of 10,000 cards would have been completed in less than 30 working days, as originally planned.

Let me know when I can be of further help to you.

Best regards,


Keith Leighton

KL:1

Enclosure: Invoice #09755

Copy to: Jean-Marc Delbecq
Noel Eberhard

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